GEOTECHNICAL REPORT
EAST 38th / PROVIDENCE
SEWER R & R
ANCHORAGE, ALASKA

November, 1993

Municipality of Anchorage
Public Works
P.O. Box 196650
Anchorage, Alaska 99501

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS
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TABLE OF CONTENTS

A. INTRODUCTION 1
B. SITE AND PROJECT DESCRIPTION 1
C. FIELD EXPLORATIONS 1
D. LABORATORY TESTING 2
E. SOIL RESISTIVITY TESTING 2
F. LIMITATIONS 2

LIST OF FIGURES

Figure 1 Site Plan and Bore hole location
Figure 2 Log of Boring F-1
Figure 3 Log of Boring F-2
Figure 4 Grain Size Classification
Figure 5 Frost Classification

GEOTECHNICAL REPORT
EAST 38th / PROVIDENCE SEWER R & R
ANCHORAGE, ALASKA

A. INTRODUCTION

This report presents the results of subsurface explorations, laboratory testing and geotechnical engineering studies for the removal and replacement of the sewer line which crosses the open field on the south east corner of Lake Otis and a service road behind Providence Hospital. The purpose of the field explorations was to define the soil and groundwater conditions for use in the design and construction for the replacement of the sewer line. Two borings were advanced at the site to quantify and qualify the insitu soil conditions. Soil samples recovered from the borings were returned to our laboratory for visual classification and material property testing. Included in this report are a description of the site and project, subsurface explorations and laboratory test results.

Authorization to proceed with this work was received verbally from Mike Krueger of Municipality of Anchorage, Public Works Department, on October 15, 1993.

B. SITE AND PROJECT DESCRIPTION

The site is a grass park with a baseball backstop in the northwest corner. The site had been recently surveyed and staked. It appeared that the surveyed alignment did not follow a direct line between the manhole covers. The borings were labelled F-1 and F-2. To assess the below ground conditions samples were retrieved at specified intervals and penetration resistances were recorded. The site plan and bore hole locations are shown in Figure 1.

C. FIELD EXPLORATIONS

The two borings, designated F-1 and F-2, were advanced at the site on the 27th of October, 1993, to define subsurface conditions. The locations of these borings are shown on Figure 1. Detailed logs of the borings are presented in Figures 2 and 3.

Drilling services for this project were provided by Discovery Drilling of Anchorage, Alaska using a truck mounted CME 75 drill rig. The borings were advanced with an 8-inch outside diameter, 4-1/4 inch inside diameter hollow-stem auger. An experienced engineer from our firm was present continuously during drilling to locate the borings, observe drill action, collect samples, log subsurface conditions, and monitor any ground water encountered.

The borings for this project were completed to depths of 16.5 feet in depth, for a total drilling footage of approximately 33 feet. As the borings were advanced, samples were recovered at 2.5, 5, 10 and 15 feet. Sampling was conducted using the Modified Penetration Test procedures. In this test, samples were recovered by driving a 2.5-inch I.D. split spoon sampler into the bottom of the advancing hole with blows from a 300-lb. hammer free-falling 30 inches onto the drill rod. The hammer was a chain driven system, in which the hammer is raised and released by a chain with a lifting clip. The number of blows required to advance the sampler the final 12 inches is termed the Modified Penetration Resistance, which was recorded for each sample. These values are shown graphically on the boring logs adjacent to the sample depth (refer to Figures 2 and 3). The values give a measure of the relative density (compactness) or consistency (stiffness) of cohesionless or cohesive soils, respectively. At the end of drilling, all borings were backfilled with native cuttings.

The locations of the borings were determined by our engineer using a cloth tape. The hole locations, shown in Figures 1 should therefore be considered approximate. The holes were marked with surveying stakes.

D. LABORATORY TESTING

Laboratory tests were performed on selected samples recovered from the borings to verify field classifications and to determine the pertinent behavior characteristics of the typical materials encountered at the site. The laboratory testing was formulated with emphasis on determining the materials classification, moisture and frost characteristics. This data plus estimated strength and density properties from the modified penetration test provided information for evaluating requirements.

A total of 5 water content tests were performed on samples from the 2 borings. These tests were conducted in accordance with procedures described in ASTM D-2216. The results of the water content measurements for samples tested for grain size are presented in Figure 5. All water contents also appear graphically adjacent to the sample blow counts on the boring logs.

Grain size classification tests for this project consisted of 3 mechanical sieve analyses to confirm the field classification and to estimate permeability characteristics and frost susceptibility. These tests were conducted according to procedures described in ASTM D-422. The results are presented in Figure 4.

Frost classifications were determined based on the results of the water contents, grainsize curves and visual identifications. Results of this work are presented on the boring logs, Figures 2 and 3, with the reference Frost Classifications sheet presented on Figure 5.

F. LIMITATIONS

The data presented in this report are based on site conditions at the time of our explorations. Continuity of subsurface conditions between borings is not implied, and as such care must be taken during design of the project.

Unanticipated soil conditions are commonly encountered and cannot fully be determined by merely taking soil samples or making test borings. Such unexpected conditions frequently require that additional expenditures be made to attain a properly constructed project. Therefore, some contingency fund is recommended to accommodate such potential extra costs.

SHANNON & WILSON, INC.

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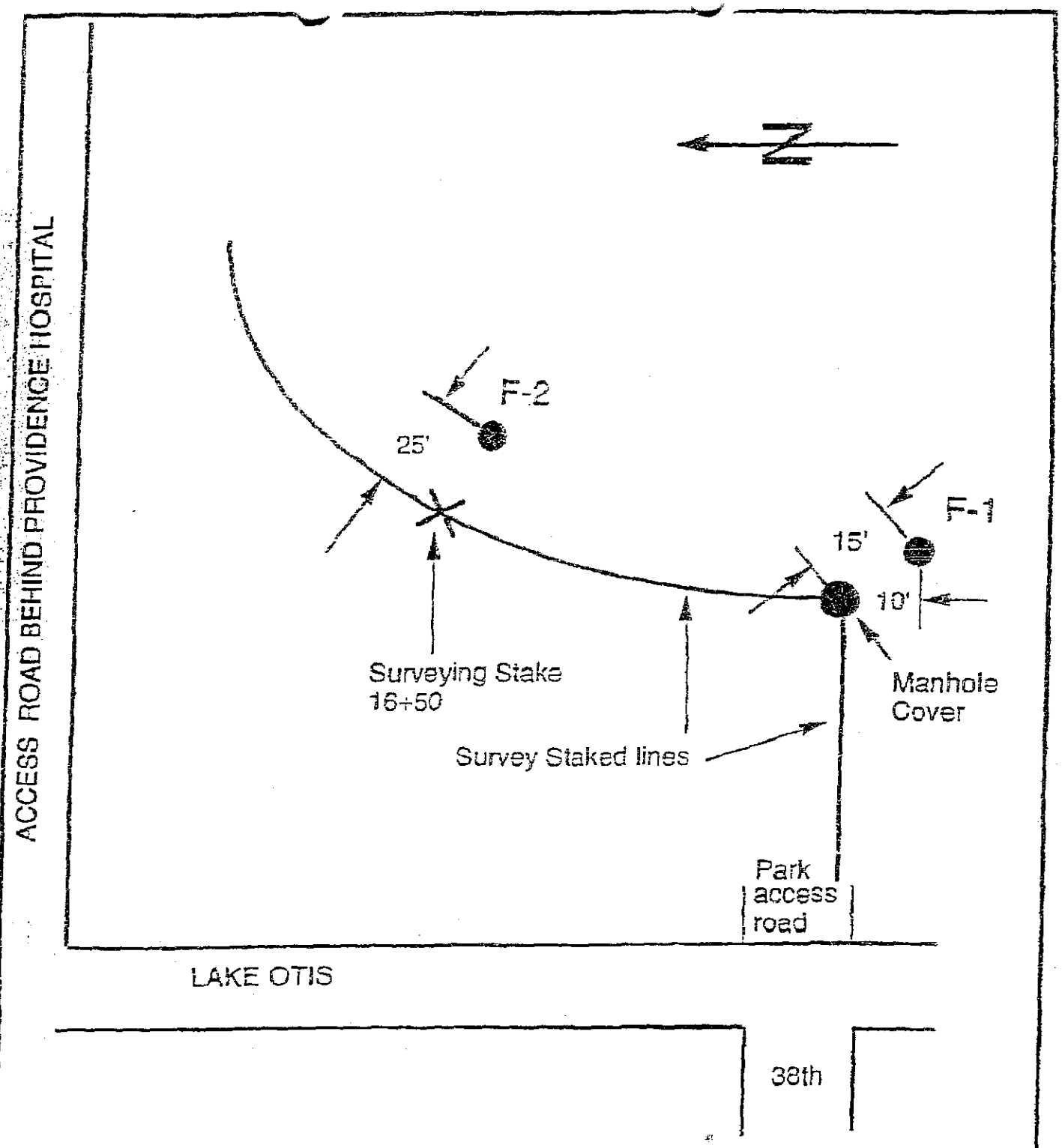


(Not to Scale)

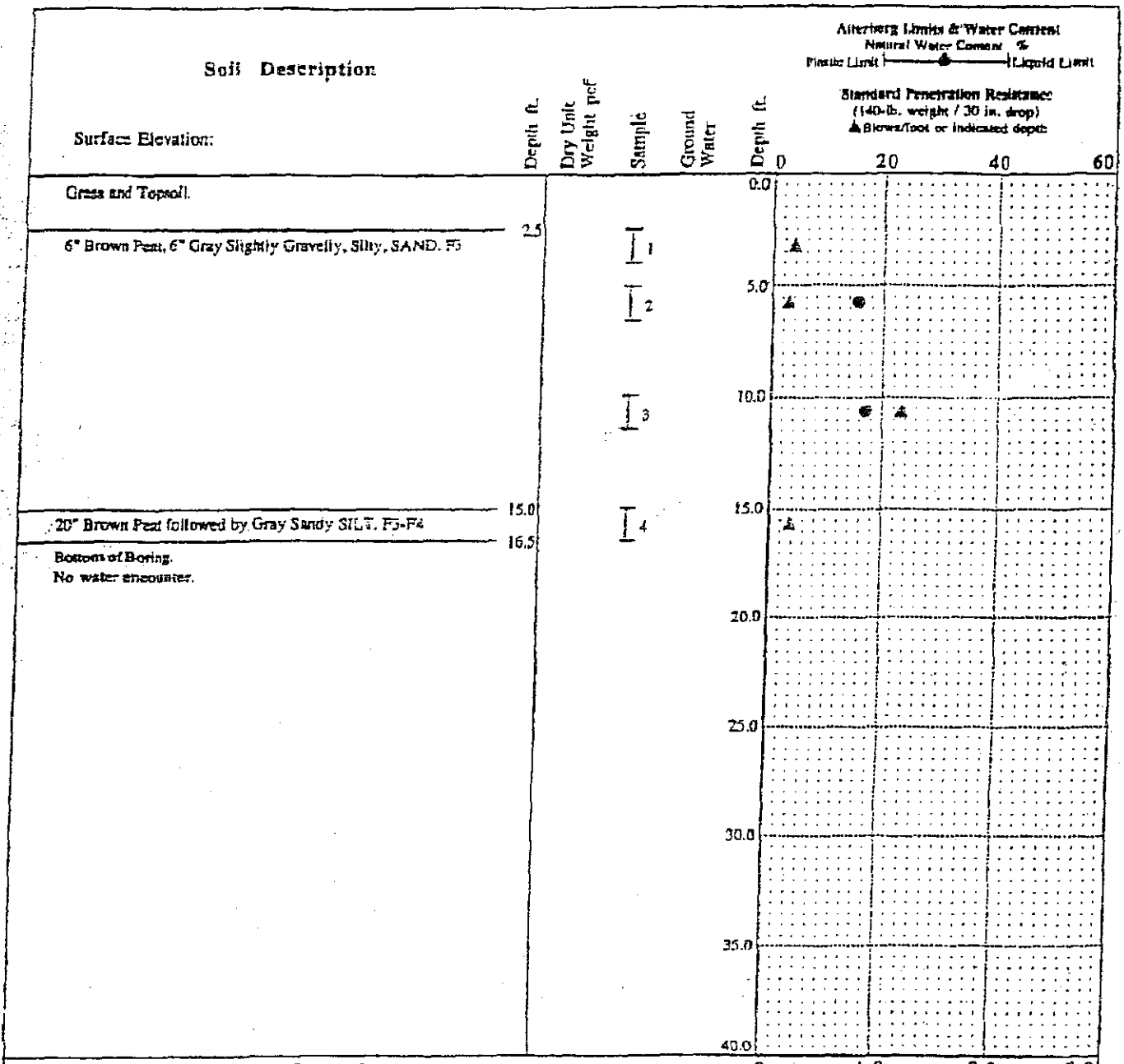
EAST 38TH/PROVIDENCE SEWER R & R
ANCHORAGE, ALASKA

Site Plan and Boring Locations

November, 1993 A-552-70

SHANNON & WILSON, INC.
Geotechnical Consultants

Fig. 1



1. Groundwater levels may vary with time, precipitation, infiltration, and other factors.
2. The stratification lines represent approximate soil boundaries. Actual boundary may be transitional.

Log of Boring 1

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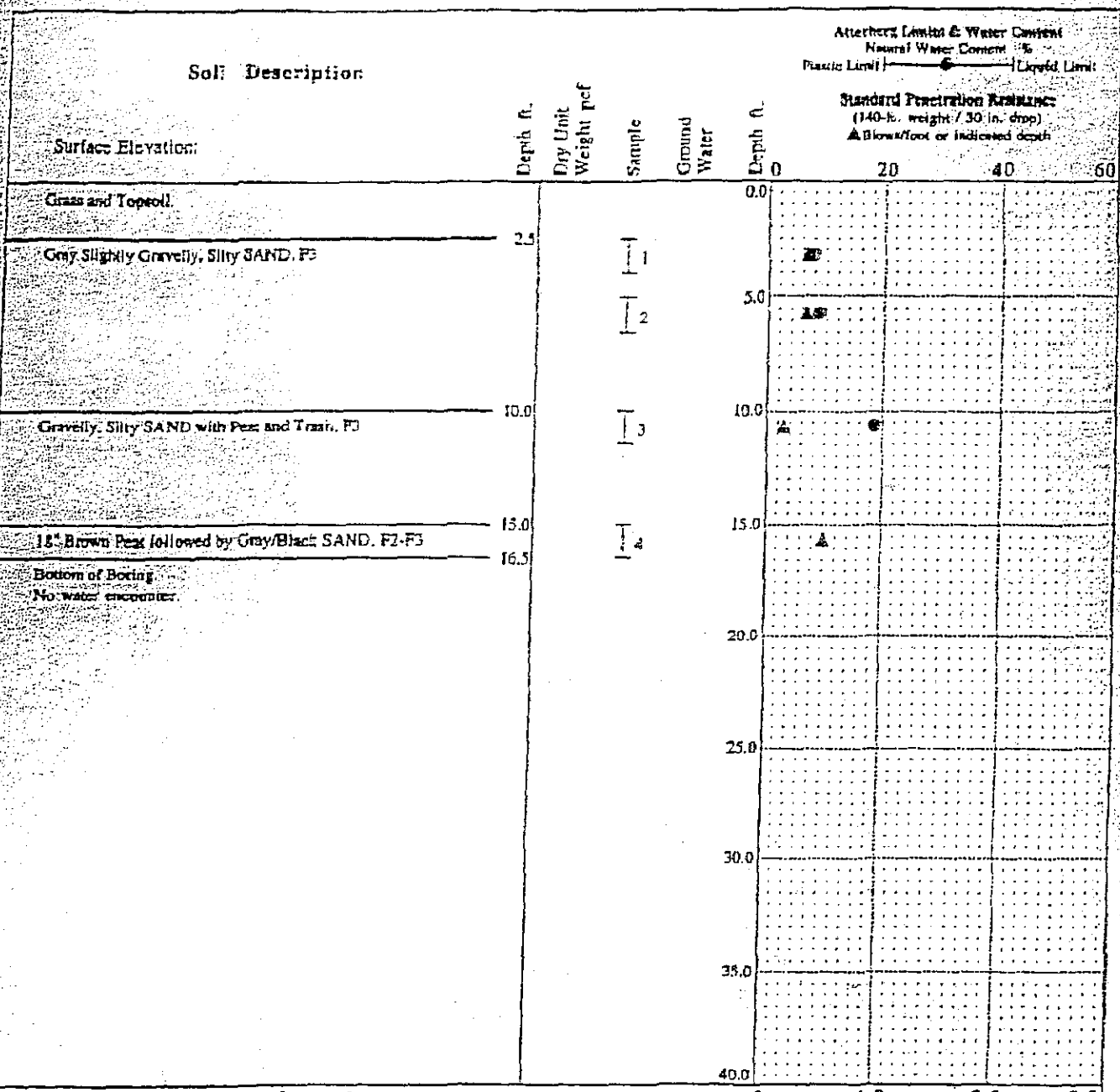
A-552-70

Fig. 2



1. Groundwater levels may vary with time, precipitation, infiltration, and other factors.
2. The stratification lines represent approximate soil boundaries. Actual boundary may be transitional.

Log of Boring 2

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A-552-70

Fig. 3

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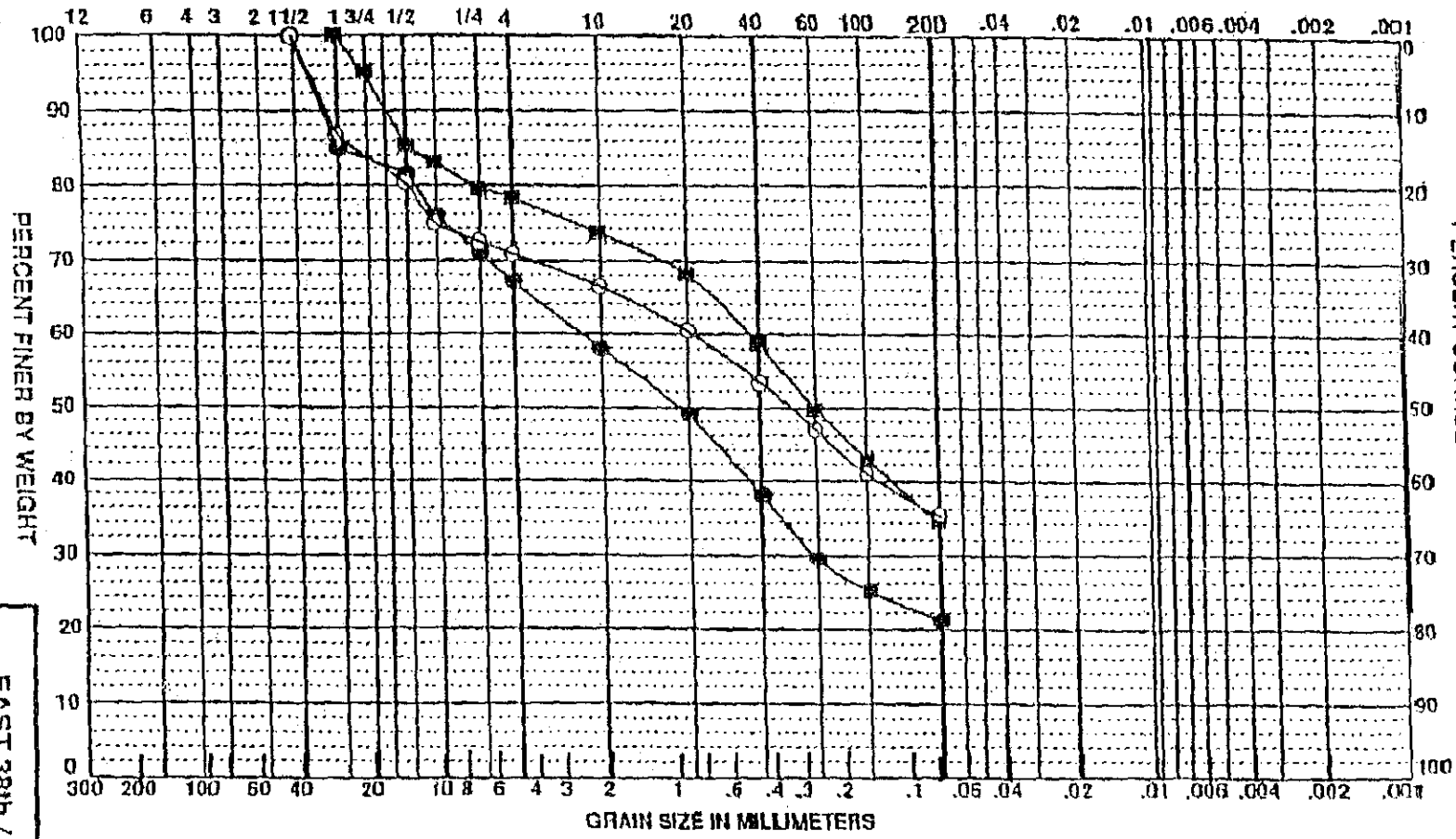

SAMPLE NO.	DEPTH, FT.	U.S.C.	CLASSIFICATION	W.C.%	LL	PL	PI
Boring 1, S3	10	SM	● Silty, Gravelly SAND	17.1			
Boring 2, S2	5	SM	■ Gravelly, Silt and SAND	8.9			
Boring 2, S3	10	SM	○ Gravelly, Silt and SAND	18.6			

EAST 38th / PROVIDENCE

GRAIN SIZE CLASSIFICATION

November, 1993

A-552-70

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Fig. 4

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August 20

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At Shannon & Wilson, our mission is to be a progressive, well-managed professional consulting firm in the fields of engineering and applied earth sciences. Our goal is to perform our services with the highest degree of professionalism with due consideration to the best interests of the public, our clients, and our employees.

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Project No. 32-1-015[illegible]

TLO 92-64.01

TABLE OF CONTENTS

	Page
1.0 INTRODUCTION	1
2.0 SITE AND PROJECT DESCRIPTION	1
3.0 SUBSURFACE EXPLORATIONS	2
4.0 LABORATORY TESTING	3
5.0 SUBSURFACE CONDITIONS	4
6.0 ENGINEERING RECOMMENDATIONS	6
6.1 Building Foundations	6
6.2 Drainage	6
6.3 Asphalt Pavement	7
6.4 Utility Trenches	7
6.5 Relocation of Utility Lines	7
7.0 CLOSURE AND LIMITATIONS	9

LIST OF FIGURES

Figure 1	Vicinity Map
Figure 2	Site Map
Figure 3	Subsurface Profile A-A'
Figure 4	Subsurface Profile B-B'
Figure 5	Proposed Utility Relocation

LIST OF APPENDICES

Appendix A	Field and Laboratory Results
Appendix B	Shannon & Wilson, Inc., Geotechnical Report: East 38th / Providence Sewer R&R
Appendix C	DOWL Engineers Preliminary Subsurface Investigation Report
Appendix D	AWWU Asbuilt 18873
Appendix E	AWWU Utility Relocate Information Packet
Appendix F	Important Information About Your Geotechnical/Environmental Report

GEOTECHNICAL REPORT
MHTL SUBDIVISION
ANCHORAGE, ALASKA

1.0 INTRODUCTION

This report presents the results of our subsurface explorations, laboratory testing, and geotechnical engineering studies for Tract E of the MHTL Subdivision, located off Lake Otis Parkway and Providence Drive, Anchorage, Alaska. The field explorations for this project were conducted on August 8, 2002. The purpose of this geotechnical study was to explore subsurface conditions, provide a narrative description of the subsurface conditions encountered, provide preliminary foundation recommendations and evaluate sewer easement limitations. To develop the criteria for use in the design, seven soil borings were advanced within the proposed area of development. Soil samples recovered from the borings were tested in our geotechnical laboratory. Presented in this report are descriptions of the site and project, subsurface exploration and laboratory test procedures, and an interpretation of subsurface conditions.

Written authorization to proceed with this work was received in the form of a signed proposal from Alison Smith on July 10, 2002. Our work was conducted in general accordance with our July 5, 2002, proposal.

2.0 SITE AND PROJECT DESCRIPTION

The project area is located near the intersection of Lake Otis Parkway and Providence Drive in Anchorage, Alaska. The property is in Tract E, of the MHTL Subdivision. A vicinity map is included as Figure 1.

At the time of geotechnical exploratory activities, the lot was undeveloped except for a baseball backstop and a utility easement shown on Figure 2. The utility easement includes Street Maintenance storms drains and Anchorage Water and Wastewater Utility (AWWU) sewer lines that run diagonally across the center and northeastern portion of the site. The utility easement is 40 feet wide and within this easement there are 7 manholes. The west side of the lot had an access point locked by a gate and padlock. The drill rig was able to maneuver around the locked gate causing no damage to the gate or surroundings.

The edges of the lot bordering the roadways were densely vegetated with large birch and spruce trees. The middle region of the lot was also vegetated with tall grasses and occasional willow, alders, and spruce trees scattered through out the lot. The surface of the lot was relatively flat and continuous and free of standing water. A large fence was present separating the empty lot from the McLaughlin Youth Center to the east. Topography maps and field explorations suggest that the site appears to have been a relatively low lying, marshy area at one time. Mike Krueger, of the Municipality of Anchorage, stated that the lot was filled in the early 1980's to accommodate ball fields and possibly other facilities.

3.0 SUBSURFACE EXPLORATIONS

Subsurface explorations consisted of advancing and sampling seven soil borings, designated Borings B-1 through B-7, to characterize the subsurface conditions. The boring locations shown on Figure 2 and the elevations noted in the boring logs were positioned by an engineer from our office. Boring locations were measured with a cloth tape and pacing relative to prominent landmarks on-site. The elevations of the borings were estimated from the as-built provided by AWWU. These locations and elevations should therefore be considered approximate. The locations of the borings are identified on Figure 2.

The borings were advanced to depths of 16.5 feet below the ground surface (bgs) respectively. Soil samples were collected at 2.5 feet bgs intervals for the first 5 feet bgs, then at 5 foot intervals thereafter. The soils encountered were visually classified in the field according to the Unified Soils Classification System that is presented in Appendix A-1 and later verified through laboratory analysis. Frost classifications were determined for the soil types based on visual and laboratory evaluation and are shown with grain size classification results on the boring logs. The frost classification system is presented in Appendix A-2. Detailed logs of the borings are presented in Appendices A-3 through A-9.

Shannon & Wilson, Inc. completed a study along the utility easement in November 1993 for the Municipality of Anchorage Public Works. Two borings were advanced along the utility easement to a depth of 16.5 feet, to access the removal and replacement of the sewer line crossing the property. The two borings are included in the site map and also the subsurface profiles. The report and figures are attached in Appendix B.

DOWL Engineers prepared a preliminary subsurface investigation in December of 2000. This report included the results of 5 borings completed on the southern end of the study area. The borings completed by DOWL Engineers are also included on our site map and used for subsurface profiling to have a better understanding of the project area. A copy of the report prepared by DOWL Engineers is included in Appendix C.

Drilling services for this project were provided by Discovery Drilling, of Anchorage, Alaska, using a truck-mounted CME-55 drilling rig. The borings were advanced with $3^1/_4$-inch inner diameter (ID), continuous-flight, hollow-stem auger. An experienced engineer from our office was present continuously during the field work to locate the borings, observe drilling operations, recover soil samples, and log the subsurface conditions encountered in each boring. At the completion of the borings, they were backfilled using the cuttings removed during the drilling activity. A piezometer was placed in one of the boring locations to monitor future ground water levels.

As the borings were advanced, samples were recovered with a 2-inch outer diameter (OD) split-spoon sampler using Standard Penetration Test (SPT) Procedures. In this test, samples were recovered by driving the sampler into the bottom of the advancing hole with blows of a 140-hammer free falling 30 inches onto the drilling rod. The number of blows required to advance the sampler the final 12 inches of a total 18-inch penetration is termed the Penetration Resistance, which was recorded for each sample. These values are shown graphically, on the boring logs adjacent to the sample depth. The values give a measure of the relative density (compactness) or consistency (stiffness) of cohesionless or cohesive soils, respectively.

4.0 LABORATORY TESTING

Laboratory tests were performed on select samples recovered from the borings to confirm our field classifications and to determine the index properties of the typical materials encountered at the site. The laboratory testing was formulated with emphasis on determining the materials gradation properties, in situ water content, and frost characteristics. This data plus estimated strength and density properties determined from Standard Penetration tests provided information used in formulating our recommendations.

Water content tests (32 total) were performed on samples collected from the borings. Water content tests were generally conducted according to procedures described in American Society for Testing and Materials (ASTM) D-2216. The results of the water content measurements are presented graphically on the boring logs in Appendix A.

Grain size classification tests (3 total) were conducted to confirm the field classification of the soils encountered. The results from these tests were used to evaluate the suitability of excavated material for reuse as backfill. The gradation testing generally followed procedures described in ASTM C-136. The grain size testing results are presented in Appendix A-10, and summarized on the boring logs as percent gravel, percent sand, and percent silt.

Atterberg limits were determined for 2 samples of the native fine-grained soils encountered in the explorations. The test was performed in accordance with ASTM D-4318. This analysis provides information on the plasticity characteristics of the silt. The results of this test are summarized on the boring logs and also on the Plasticity Chart in Appendix A-1.

5.0 SUBSURFACE CONDITIONS

The subsurface conditions encountered at the site are depicted in the subsurface profiles in Figures 3 and 4 and in more detail in the boring logs in Appendices A-3 through A-9. In general our borings encountered a vegetative mat approximately 2 to 6 inches thick overlying complexly interbedded gravelly, silty sands to sandy silts with large amounts of organic material and peat layers. Borings B-1 through B-4 typically had approximately 8 feet of gravelly, silty sand to silty, gravelly sand beneath the surface vegetative mat. At approximately 8 to 14 feet bgs peat was encountered. The peat layer had very low blow counts averaging 3 to 10 blows per foot. The material was moist and consisted largely of organic fragments with silt and sand. Sandy silt was encountered at depths of 14 feet bgs to the remainder of the boring. Blows counts increased at this depth averaging 15 blows per foot.

Borings B-5, B-6, and B-7 were located on slightly higher ground than the other 4 borings and had similar lithologies. The top 2 to 6 inches of the borings consisted of a thick vegetative mat rich in organics, silt, and sand. Beneath this mat silty, gravelly sand was encountered and transitioned to a slightly silty, gravelly sand with depth to the bottom of the boring. The blow counts also increased with depth averaging 40 blows per foot at the base of the boring.

The results of lab testing on the soil samples indicated that Borings B-1 through B-4 have high silt contents ranging from 15 to 46.6 percent silt. The high silt content classifies these soils to be highly frost susceptible and have a frost classification of F3 and F4. The borings studied at higher elevations, B-5, B-6, and B-7, have lower silt contents averaging between 5 and 10 percent silt and have lower frost susceptibility. These samples are classified as F1 and F2.

Moisture contents ranged greatly over the study area from 36.6 to 2.8 percent. The borings that were completed near the northwestern corner of the lot, on higher elevation, had considerably lower moisture contents ranging between 2.8 and 3.9 percent. The remainder of the borings on the property, B-1, B-2, B-3, B-4, & B-7, had moisture contents averaging between 18 and 37 percent. High moisture contents can greatly affect the stability of silty soils under freezing conditions.

Atterberg tests were competed on two samples and determined that the soils have a low plasticity index. These soils may behave as cohesionless material if the moisture content remains low. The results of these tests are shown in Appendix A.

Groundwater was encountered in 2 of our 7 borings at the time of exploration. Borings B-2, and B-4 showed water levels of 11 feet bgs and 14 feet bgs, respectively. A piezometer was placed in one of the boring locations, Boring B-4, to monitor ground water levels. The piezometer was field checked for ground water levels on August 22, 2002. The depth at which groundwater was encountered was 13.7 feet bgs, and only varied by about 3 inches from the time of drilling. However, groundwater levels are subject to variation due to seasonal changes.

Two cross sections were created to show the relationship of subsurface conditions among the borings completed by not only Shannon & Wilson, Inc., but also DOWL Engineers. Figure 2 indicates the location of the cross section lines and the profiles are attached as Figure 3 and Figure 4. Two separate cross section lines were chosen to maximize the utilization of the information provided by the borings. Section line A-A' runs northwest to southeast and section line B-B' runs approximately northeast to southwest. The subsurface materials encountered by Shannon & Wilson, Inc. in 1993, and DOWL Engineers in 2000 were similar to that of the recent borings and these findings are shown in Figures 3 and 4.

6.0 ENGINEERING RECOMMENDATIONS

6.1 Building Foundations

Design of the building's foundation must consider the bearing support capabilities of the soils as well as the expected settlements and the effects of seasonal frost action. Our borings indicate that the northwestern corner of the property tends to have denser granular material than that of the soils on the remainder of the lot. The northwestern corner is also higher in elevation. It is our opinion that these medium dense to dense native soils would provide adequate support for site development. The structure, depending on size, may be supported using spread or strip footings bearing on the dense native soils or on compacted structural fill bearing on these native soils.

In our explorations, the remainder of the lot typically had a poorly consolidated fill overlying a soft, compressible soil layer at approximate depths of 8 to 14 feet bgs. Due to this soft, compressible soil layer, it is our opinion that over excavation of the compressible soil layer would be necessary to improve the conditions for footing foundations. The unsuitable material should then be discarded and the excavation area should be backfilled with the original top 8 feet of overburden as compacted structural fill. Constructing a basement in the area of excavation would reduce the cost of earthwork but would require the basement floor to be built above the water table and/or may require additional drainage measures. This may or may not be feasible due to the shallow ground water levels present across the site area. Settlement is not expected to be an issue for structural design footings constructed on structural fill bearing on competent native soils at depth.

From our experience, the native materials found at depth should also be competent to support a pile foundation design if the piles driven far enough into native soils. However, the borings we completed were limited 16.5 feet bgs and deeper exploration would be necessary to determine the suitability of pile foundations with future development plans.

6.2 Drainage

The existing surface that would act as the subgrade of the pavements are highly frost susceptible (F3 and F4), and thus, sensitive to increased moisture. Care should be taken to optimize drainage

off of planned pavement surfaces and away from building foundations to prevent the addition of moisture to the subgrade soils. This can be achieved by making sure that areas around the building are contoured to drain surface waters away from the building and off the site. In addition, perimeter footing drains should be incorporated in the design of below-grade building spaces.

6.3 Asphalt Pavement

Design of a final grade of the pavement requires consideration of the density of soils, site drainage, frost susceptibility of the soils, and grade requirements for lightly loaded parking lots. Our explorations revealed that on average, the native materials range from loose to dense, and are relatively frost susceptible with frost classification of F3 and F4. However, it is our opinion that the native soils could support a pavement section if the surface material was removed and backfilled with non-frost susceptible material or the grade was raised with non-frost susceptible soils. In either case, insulation may be a solution to controlling frost penetration into the frost susceptible subgrade.

6.4 Utility Trenches

Buried pipes and cables will be needed to tie the new facility into area water, sewer, gas, communication and other utilities. Since groundwater was encountered by our borings and the subsurface soils are relatively loose, trenches may need to be de-watered prior to excavation or accommodated by sumps and pumps to handle seepage. In addition to water removal, the use of a trench box or widening trench walls may be necessary to stabilize trench walls during construction.

6.5 Relocation of Utility Lines

Future development for this site is limited due to the large sewer and storm drain easements extending diagonally through the northern half of the site. Relocation options for the easements were researched along with estimated costs associated with relocation. The following information was provided by the planning office at AWWU.

The current utilities that extend into the site area are sewer and street maintenance lines and are approximately 10 to 15 feet bgs. The two lines enter the lot across from the intersection of Lake Otis Parkway and East 38th Avenue heading due west and extend into the site area before turning and heading toward the northeastern corner of the lot. There are several manholes located along these lines within the site area that have been marked by AWWU and Street Maintenance. Appendix D is an as-built drawing provided by AWWU of grids 1733 & 1734, showing the utility locations.

Relocating the sewer and street maintenance lines from their original position would require an adequate slope to match that of the current gradient to provide sufficient flow within the lines. There are two relocation possibilities that have been assessed. The first option includes extending the utilities eastward just beyond the eastern border of the property, rather than bend at the center of the parcel, and extend northward to Providence Drive along the property edge. There would be sufficient slope for adequate flow through the sewer and storm drain lines, similar to current conditions. This scenario for relocating the storm drain and sewer lines eastward is shown as Option 1 in Figure 5. This relocation would require 1,100 feet of utility reconstruction.

Option 2 for relocating the lines is to extend the utilities eastward an additional 200 feet from its original location, then cut diagonally along the west side of the McLaughlin Youth Center fence on the east side of the lot. Three of the recent boring locations were placed along this proposed pathway, Borings B-2, B-3, and B-4 to determine the subsurface conditions for the proposed relocation. Figure 5 is a map showing this relocation scenario as Option 2. This change in position would also provide adequate slope for sufficient drainage through the utility lines. Absent 950 feet of utility reconstruction would be required for this scenario.

The new utility lines would require at least a 30-foot easement at the owner's expense. A shift from the original position of the easement to either of the proposed relocations would create a new easement line of approximately 1,100 and 950 feet respectively. The estimated cost to relocate sewer and street maintenance lines is approximately $150 per foot for each line. To relocate 1100 feet of line within the MHTL Subdivision property would cost an estimated $330,000 and to relocated 950 feet of line the expense would be an estimated $285,000.

If the private owner decides to relocate the easement it is their responsibility to hire the design crew and contractors at their expense. Included in this report is Appendix E, a packet provided by AWWU, information regarding private development of utility easements.

7.0 CLOSURE AND LIMITATIONS

The analyses, conclusions, and recommendations contained in this report are based on site conditions as they presently exist. It is assumed that the exploratory borings are representative of the subsurface conditions throughout the site, i.e., the subsurface conditions everywhere are not significantly different from those disclosed by the explorations.

If, during subsequent design and/or construction, subsurface conditions different from those encountered in these and prior explorations are observed or appear to be present, Shannon & Wilson should be advised at once so that these conditions can be reviewed and recommendations can be reconsidered where necessary. If there is a substantial lapse of time between the submittal of this report and the start of work at the site, or if conditions have changed due to natural causes or construction operations at or adjacent to the site, it is recommended that this report be reviewed to determine the applicability of the conclusions and recommendations considering the changed conditions and time lapse.

Unanticipated soil conditions are commonly encountered and cannot fully be determined by merely taking soil samples or advancing borings. Such unexpected conditions frequently require that additional expenditures be made to attain a properly constructed project. Therefore, some contingency fund is recommended to accommodate such potential extra costs. Shannon & Wilson has prepared the attachments in Appendix F "Important Information About Your Geotechnical/Environmental Report" to assist you and others in understanding the use and limitations of the reports.

Sincerely,
SHANNON & WILSON, INC.

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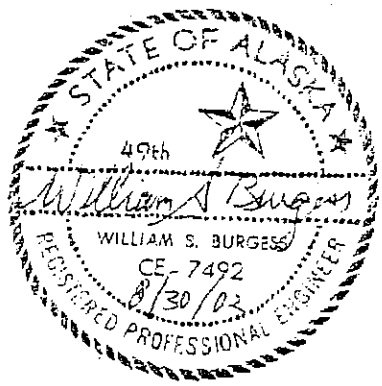
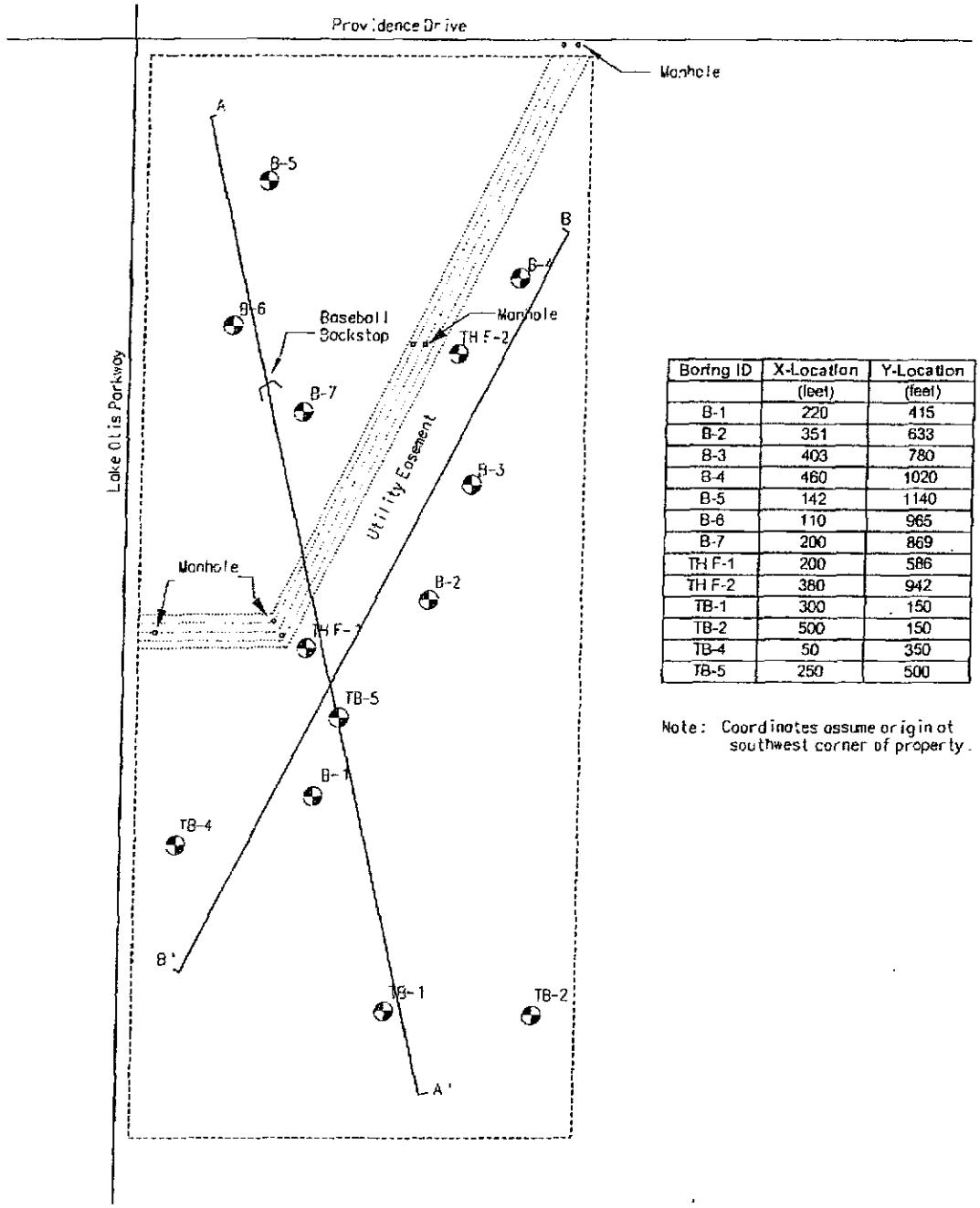
Geotechnical Engineer

Reviewed by:

William S. Burgess, P.E.
Associate





Boring ID	X-Location (feet)	Y-Location (feet)
B-1	220	415
B-2	351	633
B-3	403	780
B-4	460	1020
B-5	142	1140
B-6	110	965
B-7	200	869
TH F-1	200	586
TH F-2	380	942
TB-1	300	150
TB-2	500	150
TB-4	50	350
TB-5	250	500

Note: Coordinates assume origin at southwest corner of property.

LEGEND:

- B-2 — BORING ADVANCED ON AUGUST 8, 2002 BY SHANNON AND WILSON INC.
- TH F-1 — BORING ADVANCED ON OCTOBER 27, 1993 BY SHANNON AND WILSON INC.
- TB-1 — BORING ADVANCED ON DECEMBER 18, 2000 BY DOWL ENGINEERS
- A — A' — CROSS SECTION LINE

0 200 400
APPROXIMATE SCALE IN FEET

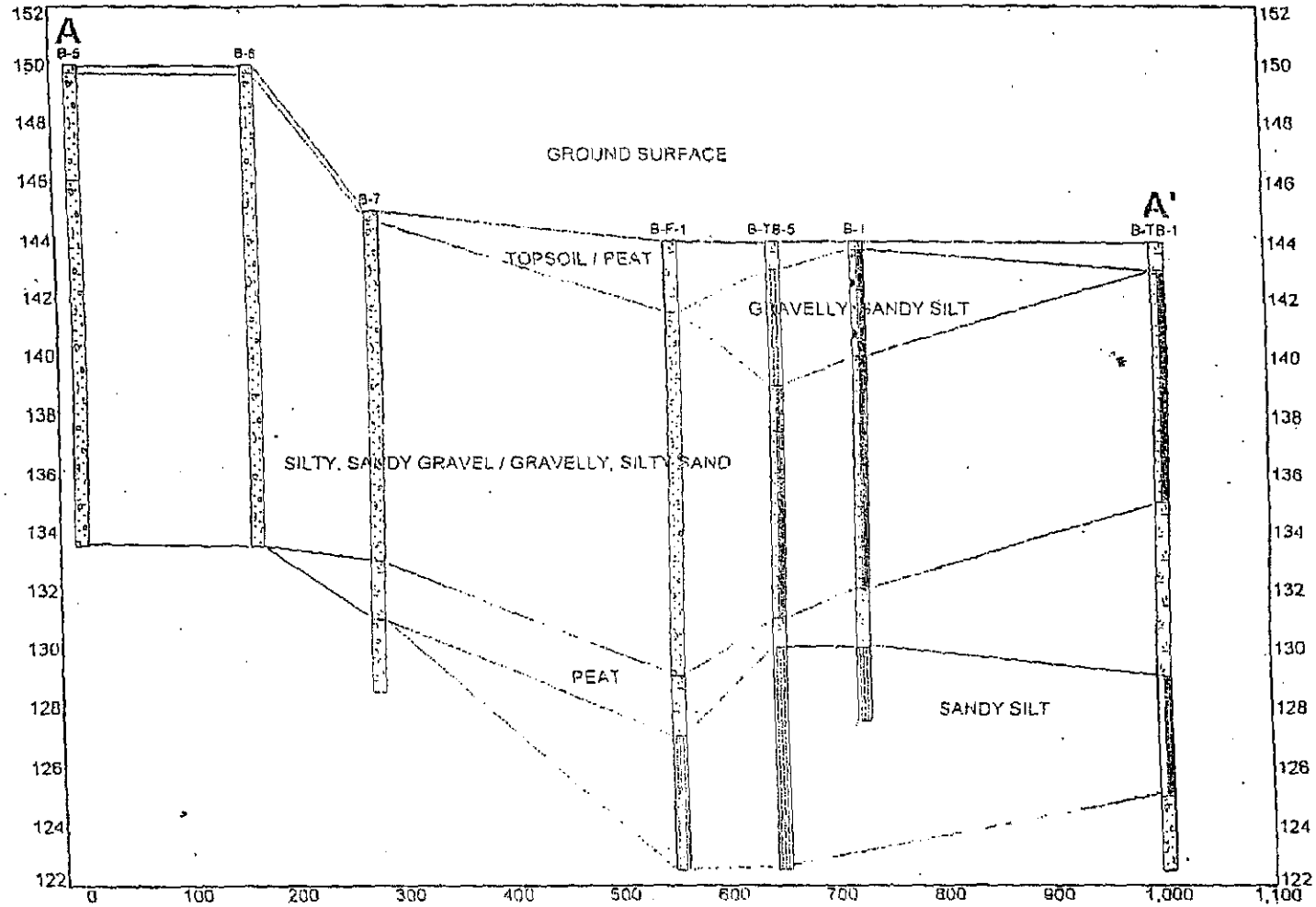
MHTL Subdivision
Anchorage, Alaska

SITE MAP

August 2002 32-1-01527

SHANNON & WILSON, INC.
Geotechnical & Environmental Consultants

Fig. 2



MHTL Subdivision
Anchorage, Alaska

Subsurface Profile A-A'

August 2002

32-1-01527

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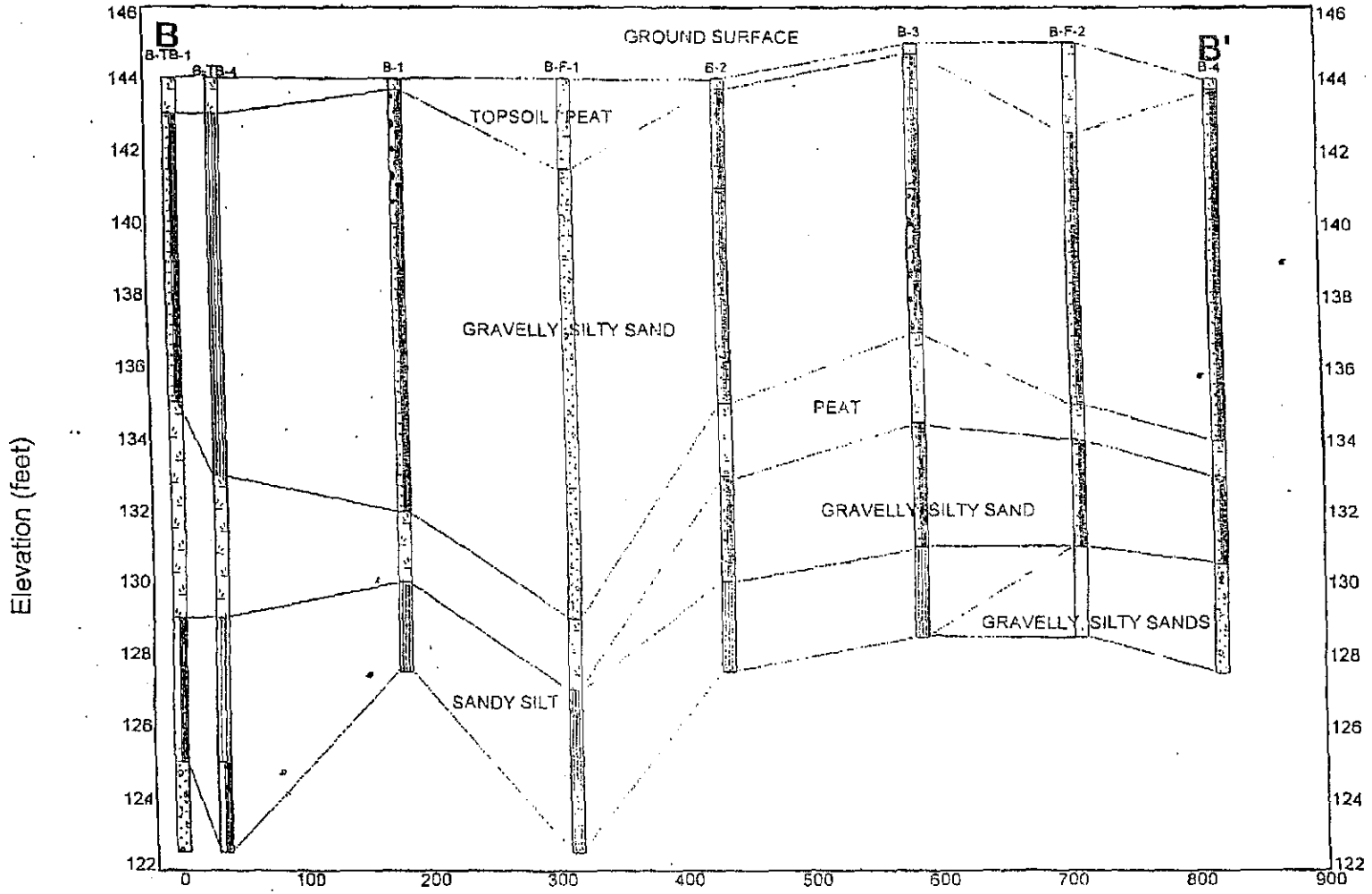
Figure 3



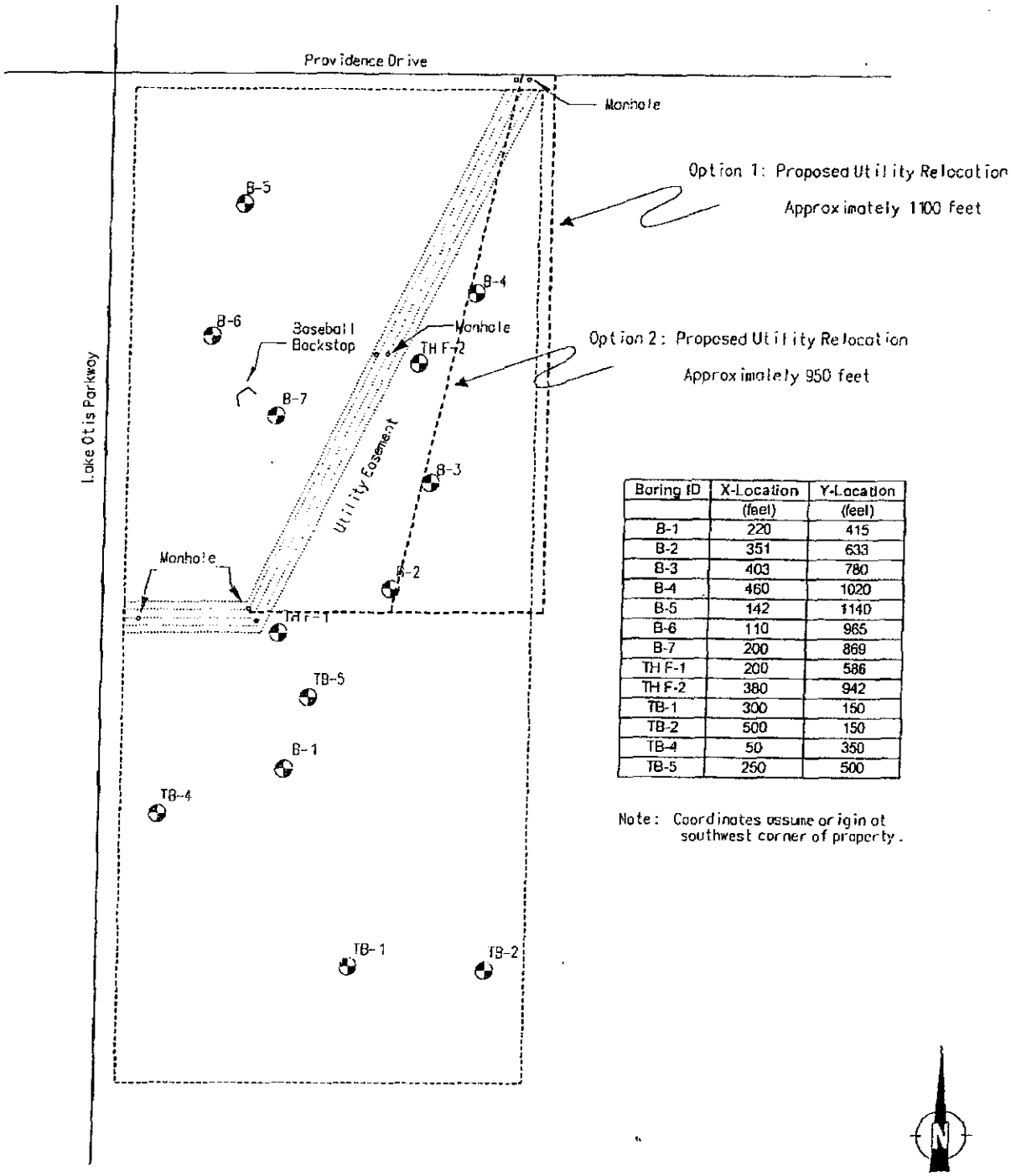
MHTL Subdivision
Anchorage, Alaska

Subsurface Profile B-B'

August 2002 32-1-01527

SHANNON & WILSON, INC.
Geotechnical & Environmental Consultants

Figure 4



Boring ID	X-Location (feet)	Y-Location (feet)
B-1	220	415
B-2	351	633
B-3	403	780
B-4	460	1020
B-5	142	1140
B-6	110	965
B-7	200	869
TH F-1	200	586
TH F-2	380	942
TB-1	300	150
TB-2	500	150
TB-4	50	350
TB-5	250	500

Note: Coordinates assume origin at southwest corner of property.

LEGEND:

B-2 BORING ADVANCED ON AUGUST 8, 2002 BY SHANNON AND WILSON INC.

TH F-1 BORING ADVANCED ON OCTOBER 27, 1993 BY SHANNON AND WILSON INC.

TB-1 BORING ADVANCED ON DECEMBER 18, 2000 BY DOWL ENGINEERS

0 200 400
APPROXIMATE SCALE IN FEET

MHTL Subdivision
Anchorage, Alaska

Proposed Utility Relocation

August 2002 32-1-01527

SHANNON & WILSON, INC.
Geotechnical & Environmental Consultants

Fig. 5

APPENDIX A

FIELD AND LABORATORY RESULTS

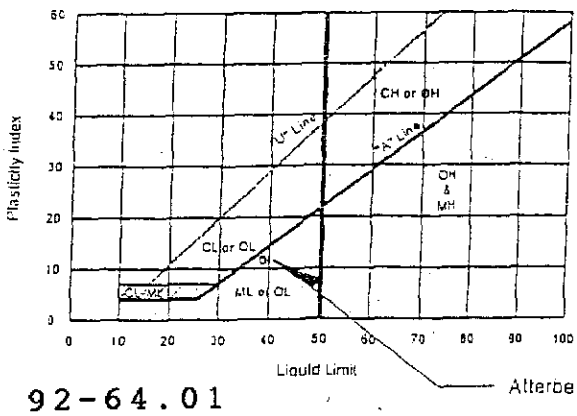
Table of Contents

Appendix A-1	Soil Classification Legend
Appendix A-2	Frost Classification
Appendix A-3	Log of Boring B-1
Appendix A-4	Log of Boring B-2
Appendix A-5	Log of Boring B-3
Appendix A-6	Log of Boring B-4
Appendix A-7	Log of Boring B-5
Appendix A-8	Log of Boring B-6
Appendix A-9	Log of Boring B-7
Appendix A-10	Grain Size Distribution Curves

Unified Soil Classification System

GROUP NAME Criteria for Assigning Group Names and Group Symbols			Soil Classification Group Symbol with Generalized Group Descriptions	
COARSE-GRAINED SOILS more than 50% retained on No. 200 sieve	GRAVELS 50% or more of coarse fraction retained on No. 4 sieve	Clean GRAVELS Less than 5% fines	GW	Well-graded Gravels
			GP	Poorly-graded Gravels
		GRAVELS with fines More than 12% fines	GM	Gravel & Silt Mixtures
			GC	Gravel & Clay Mixtures
	SANDS More than 50% of coarse fraction passes No. 4 sieve	Clean SANDS Less than 5% fines	SW	Well-graded Sands
			SP	Poorly-graded Sands
		SANDS with fines More than 12% fines	SM	Sand & Silt Mixtures
			SC	Sand & Clay Mixtures
FINE-GRAINED SOILS 50% or more passes the No. 200 sieve	SILTS AND CLAYS Liquid limit 50% or less	INORGANIC	ML	Non-plastic & Low-plasticity Silts
			CL	Low-plasticity Clays
		ORGANIC	OL	Non-plastic and Low-plasticity Organic Clays Non-plastic and Low-plasticity Organic Silts
	SILTS AND CLAYS Liquid limit greater than 50%	INORGANIC	CH	High-plasticity Clays
			MH	High-plasticity Silts
		ORGANIC	OH	High-plasticity Organic Clays High-plasticity Organic Silts
HIGHLY ORGANIC SOILS	Primarily organic matter, dark in color, and organic odor		PT	Peat

PLASTICITY CHART



Descriptive Terminology Denoting Component Proportions

Description	Range of Proportion
Add the adjective "slightly"	5 - 12%
Add soil adjective[a]	12 - 50%
Major proportion in upper case, (e.g., SAND)	>50%

(a) Use gravelly, sandy, or silty as appropriate

NOTE: The soil descriptions used in the boring logs lists constituents from smallest percentage to largest percentage.

MHTL Subdivision
Anchorage, Alaska

SOIL CLASSIFICATION LEGEND

August 2002 32-1-01527

SHANNON & WILSON, INC.
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Appendix A

SHANNON & WILSON, INC.

FROST CLASSIFICATION

(after Municipality of Anchorage)

GROUP		P-200	USC SYSTEM
NFS	Sandy Soils	0 to 3	SW, SP
	Gravelly Soils	0 to 6	GW, GP, GW-GM, GP-GM
F1	Sandy Soils	3 to 6	SW, SP, SW-SM, SP-SM
	Gravelly Soils	6 to 13	GM, GW-GM, GP-GM
F2	Sandy Soils	6 to 19	SP-SM, SW-SM, SM
	Gravelly Soils	13 to 25	GM
F3	Sands, except very fine silty sands*	Over 19	SM, SC
	Gravelly Soils	Over 25	GM, GC
	Clays, PI>12		CL, CH
F4	All Silts		ML, MH
	Very fine silty sands*	Over 19	SM, SC
	Clays, PI<12		CL, CL-ML
	Varved clays and other fined grained, banded sediments		CL and ML CL, ML, and SM; SL, SH, and ML; CL, CH, ML, and SM

P-200 = Percent passing the number 200 sieve

* Very fine sand : greater than 50% of sand fraction passing the number 100 sieve

MHTL Subdivision
Anchorage, Alaska

FROST CLASSIFICATION

August 2002 32-1-01527

SHANNON & WILSON, INC.
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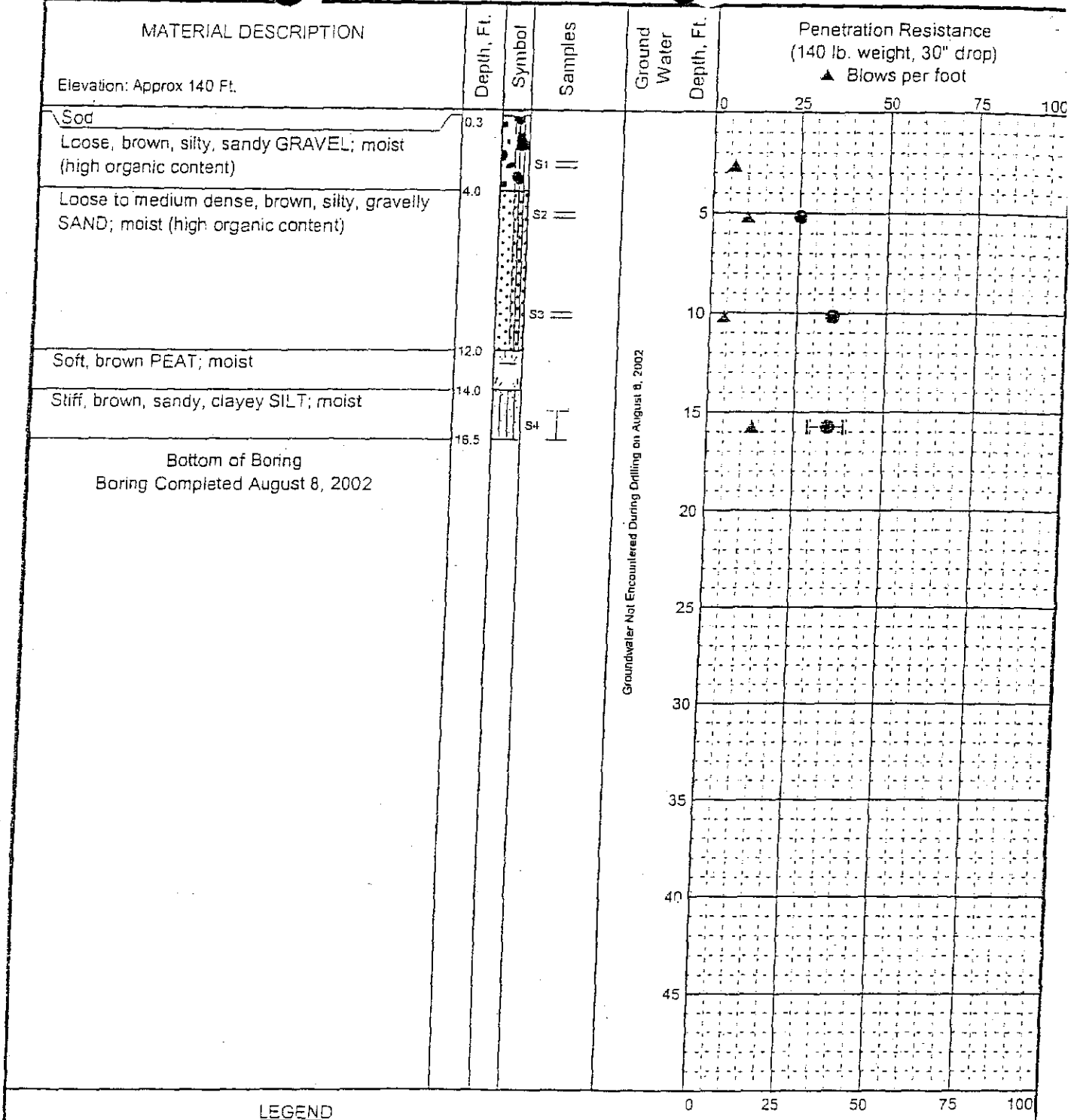
Appendix A-2 26



LEGEND

- Sample Not Recovered
- 2" O.D. Split Spoon Sample
- Ground Water Level At Time Of Drilling
- Static Water Level
- Well Screen and Filter Sand
- Well Screen and Filter Sand
- % Water Content
- Plastic Limit — Liquid Limit
- Natural Water Content

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.
4. PP (Pocket Penetrometer) tests estimate Unconfined Compressive Strength of Cohesive Soils. TV (Torvane) tests estimate the Undrained Shear Strength Horizontal (H), Vertical (V) and Remolded (R) orientations.

MHTL Subdivision
Anchorage, Alaska

LOG OF BORING B-1

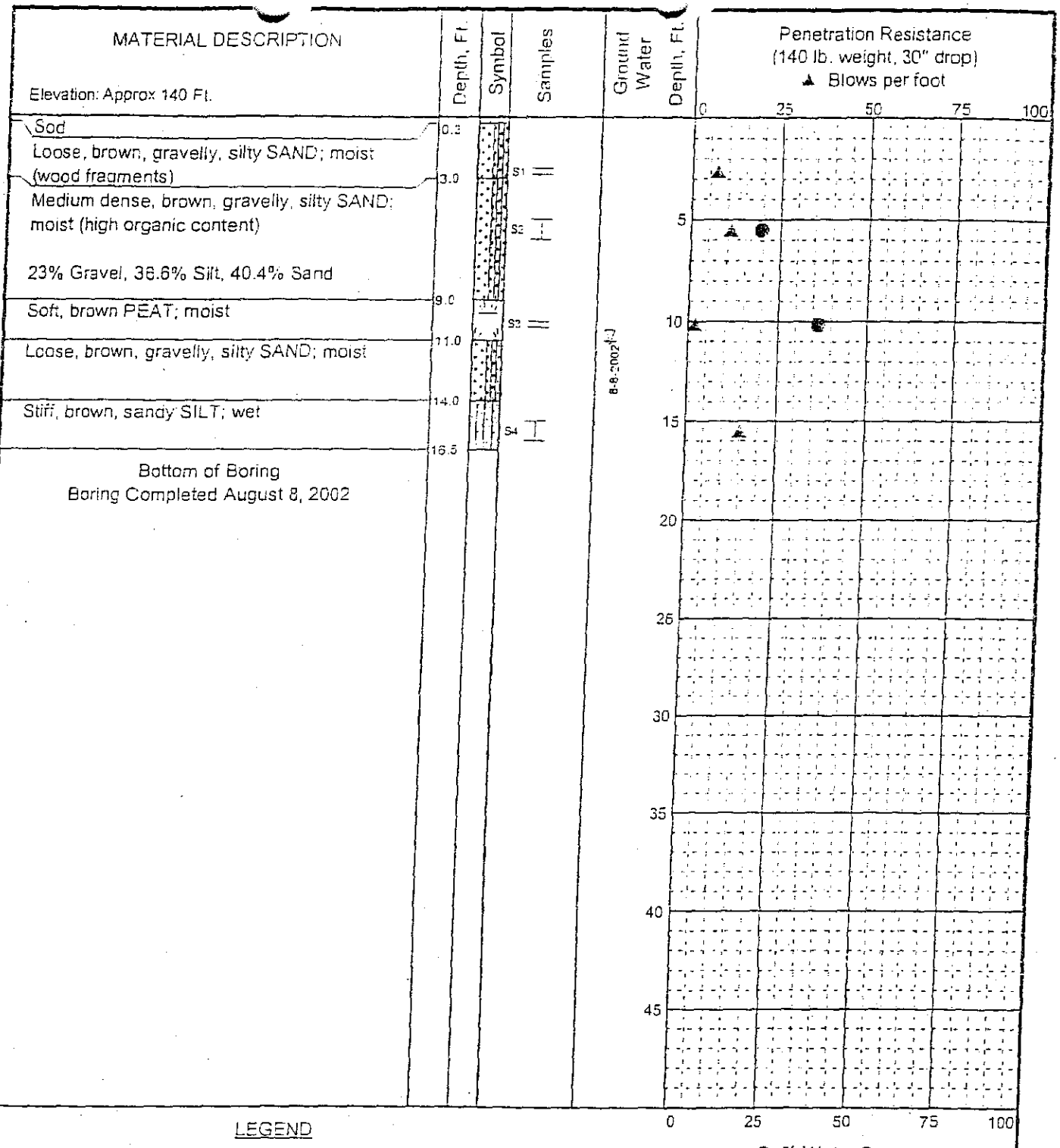
August 2002 32-1-01527

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

A-3

01 LOG A1527.GPJ S&W GEO1.GDT 8/29/02

TLO 92-64.01



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MHTL Subdivision
Anchorage, Alaska

LOG OF BORING B-2

August 2002 | 32-1-01527

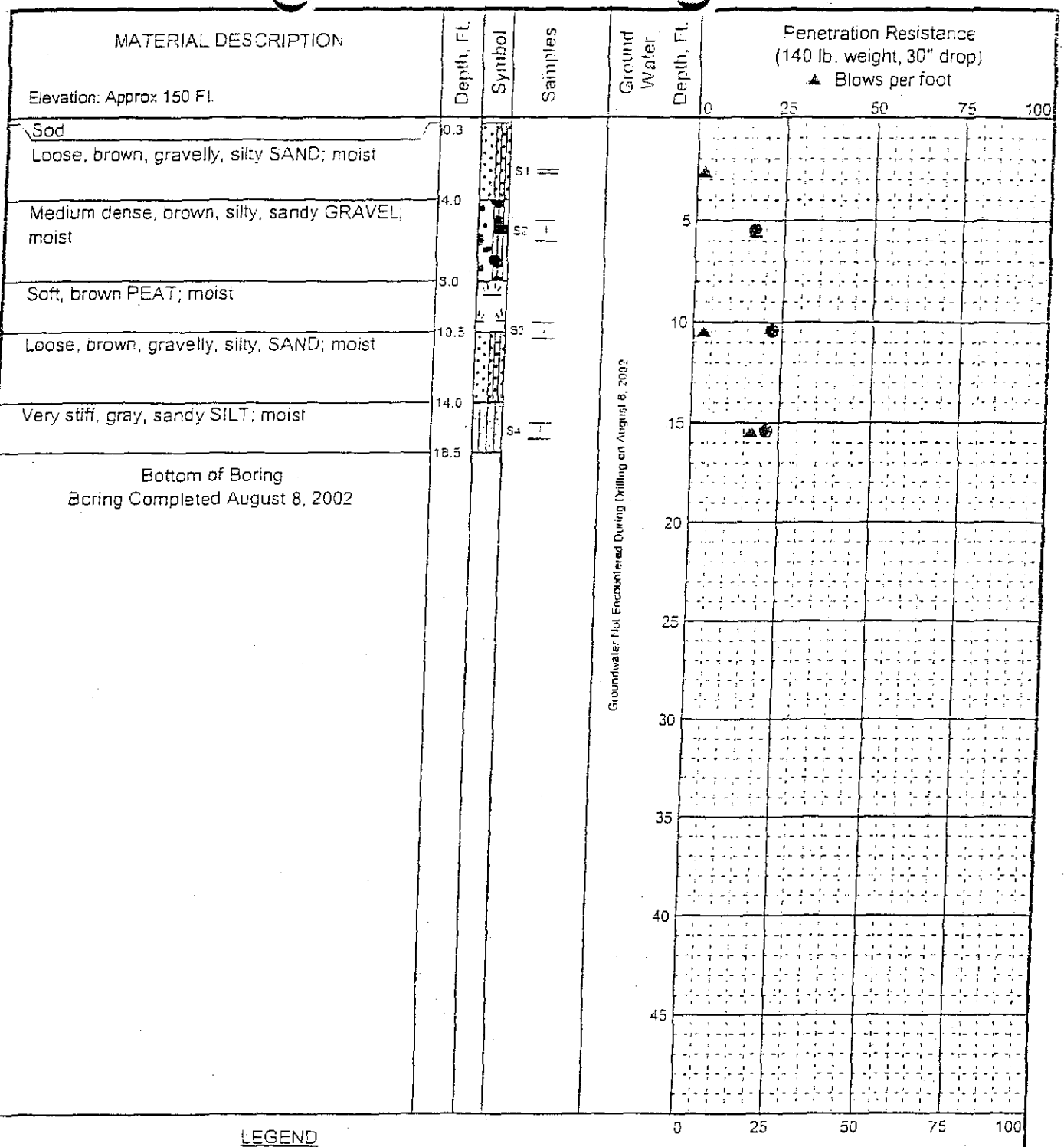
SHANNON & WILSON, INC. Geotechnical and Environmental Consultants

4

28

TLO 92-64.01

GEO1 LOG A1527.GPJ S&W GEO1.GDT 8/29/02



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MHTL Subdivision
Anchorage, Alaska

LOG OF BORING B-3

August 2002 32-1-01527

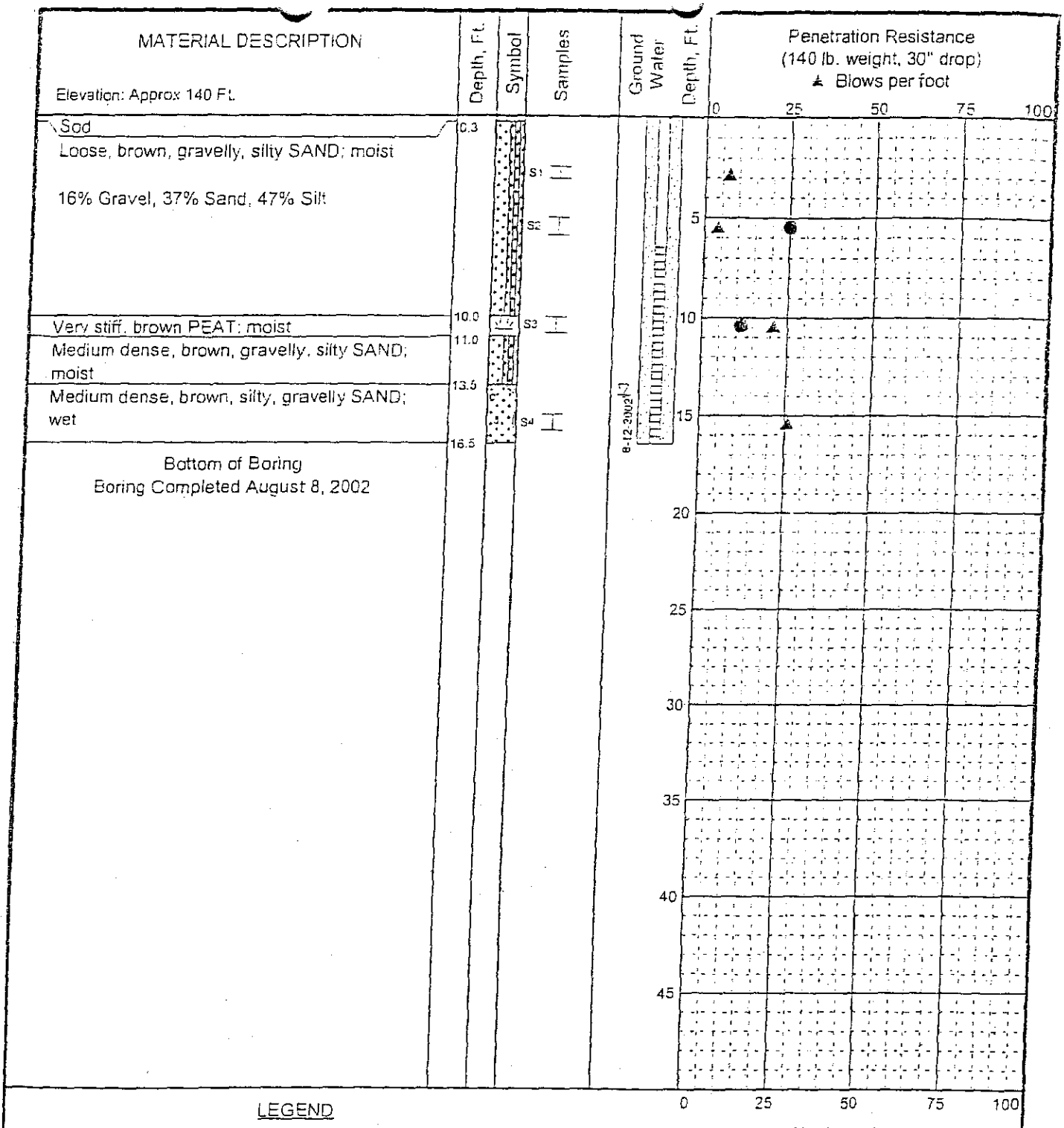
SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

A-5

01 LOG A1527.GPJ S&W GEO1.GDT 8/29/02

TLO 92-64.01

29



LEGEND

- * Sample Not Recovered
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- Ground Water Level At Time Of Drilling
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MHTL Subdivision
Anchorage, Alaska

LOG OF BORING B-4

August 2002 32-1-01527

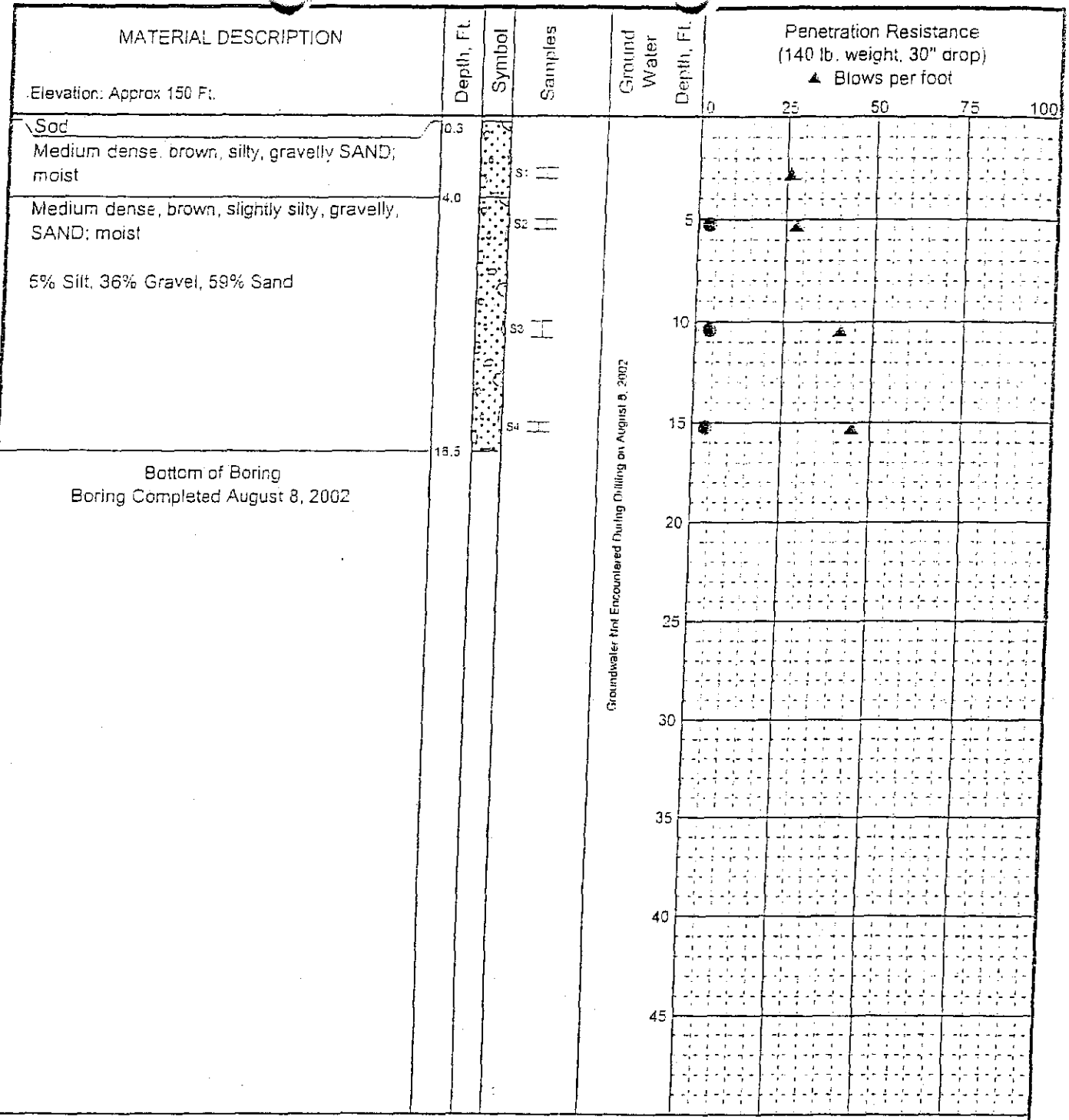
SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

A-6

ED1 LOG A1527.GPJ S&W GEO1.GDT 8/29/02

TLO 92-64.01

30



LEGEND

* Sample Not Recovered

2" O.D. Split Spoon Sample

Ground Water Level At Time Of Drilling

Static Water Level

Well Screen and Filter Sand

Well Screen and Filter Sand

● % Water Content

Plastic Limit ⊢●⊣ Liquid Limit

Natural Water Content

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MHTL Subdivision
Anchorage, Alaska

LOG OF BORING B-5

August 2002 32-1-01527

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

A-7

EO1 LOG A1527.GPJ S&W GEO1.GDT 8/29/02

MATERIAL DESCRIPTION Elevation: Aporox 150 Ft.	Depth, Ft.	Symbol	Samples	Ground Water Depth, Ft.
Sod	0.3			
Medium dense, brown, slightly silty, gravelly SAND; moist			S1 S2 S3 S4	
Bottom of Boring Boring Completed August 8, 2002	16.5			

Groundwater Not Encountered During Drilling on August 8, 2002

Penetration Resistance
(140 lb. weight, 30" drop)
▲ Blows per foot

0 25 50 75 100

5 10 15 20 25 30 35 40 45

0 25 50 75 100

LEGEND

* Sample Not Recovered

2" O.D. Split Spoon Sample

Ground Water Level At Time Of Drilling

Static Water Level

Well Screen and Filter Sand

Well Screen and Filter Sand

● % Water Content

Plastic Limit ⊢●⊣ Liquid Limit
Natural Water Content

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MHTL Subdivision
Anchorage, Alaska

LOG OF BORING B-6

August 2002 32-1-01527

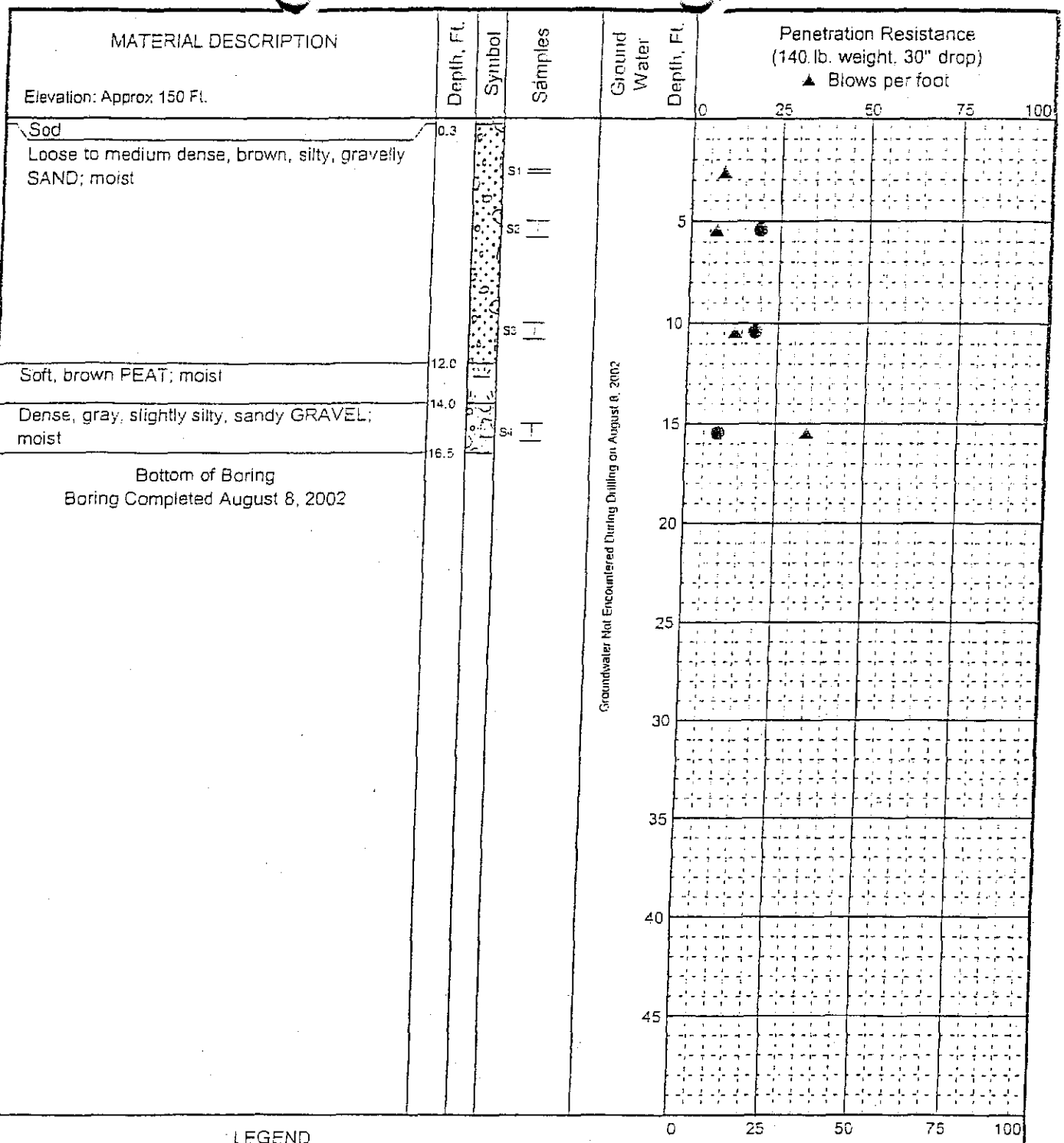
SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

A-8

EDI LOG A1527.GPJ S&W GEO1.GDT 8/29/02

TLO 92-64.01

32



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MHTL Subdivision
Anchorage, Alaska

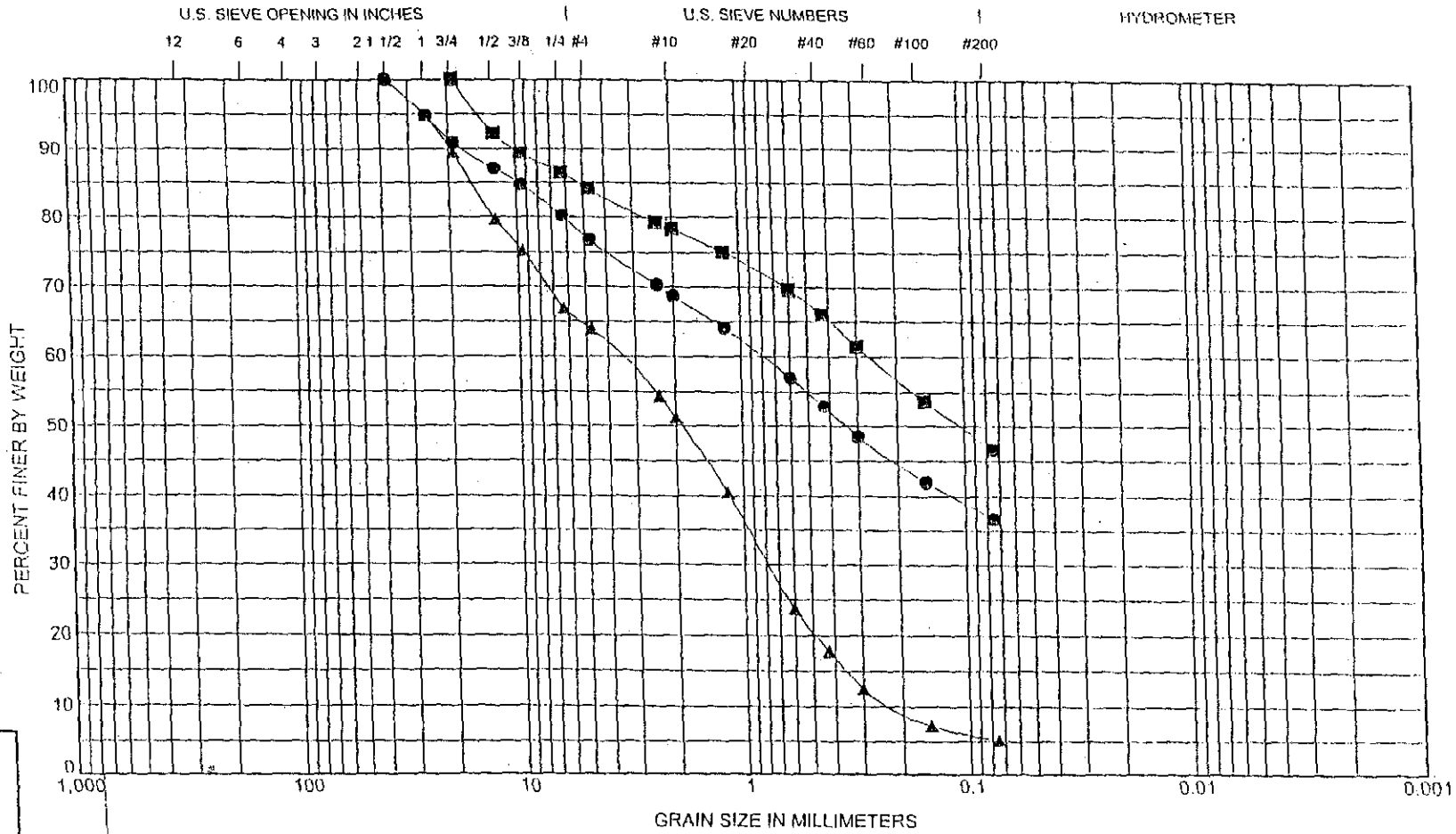
LOG OF BORING B-7

August 2002 | 32-1-01527

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

A-9

TLO 92-64.01



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Sample	Depth, Ft	Classification	LL	PL	PI	Cc	Cu
● B-2 S2	5.0 - 6.5	Gravelly, silty SAND; [SM] (F4)					
■ B-4 S2	5.0 - 6.5	Gravelly, silty SAND; [SM] (F4)					
▲ B-5 S3	10.0 - 11.5	Slightly silty, gravelly SAND; [SW] (F1)				0.8	16.6

Sample	Depth, Ft	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● B-2 S2	5.0 - 6.5	37.5	0.8			23	40	37	
■ B-4 S2	5.0 - 6.5	19	0.26			16	38	47	
▲ B-5 S3	10.0 - 11.5	37.5	3.58	0.78	0.22	36	59	5	

MHTL Subdivision
Anchorage, Alaska

GRAIN SIZE CLASSIFICATION

August 2002

32-1-015 34

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

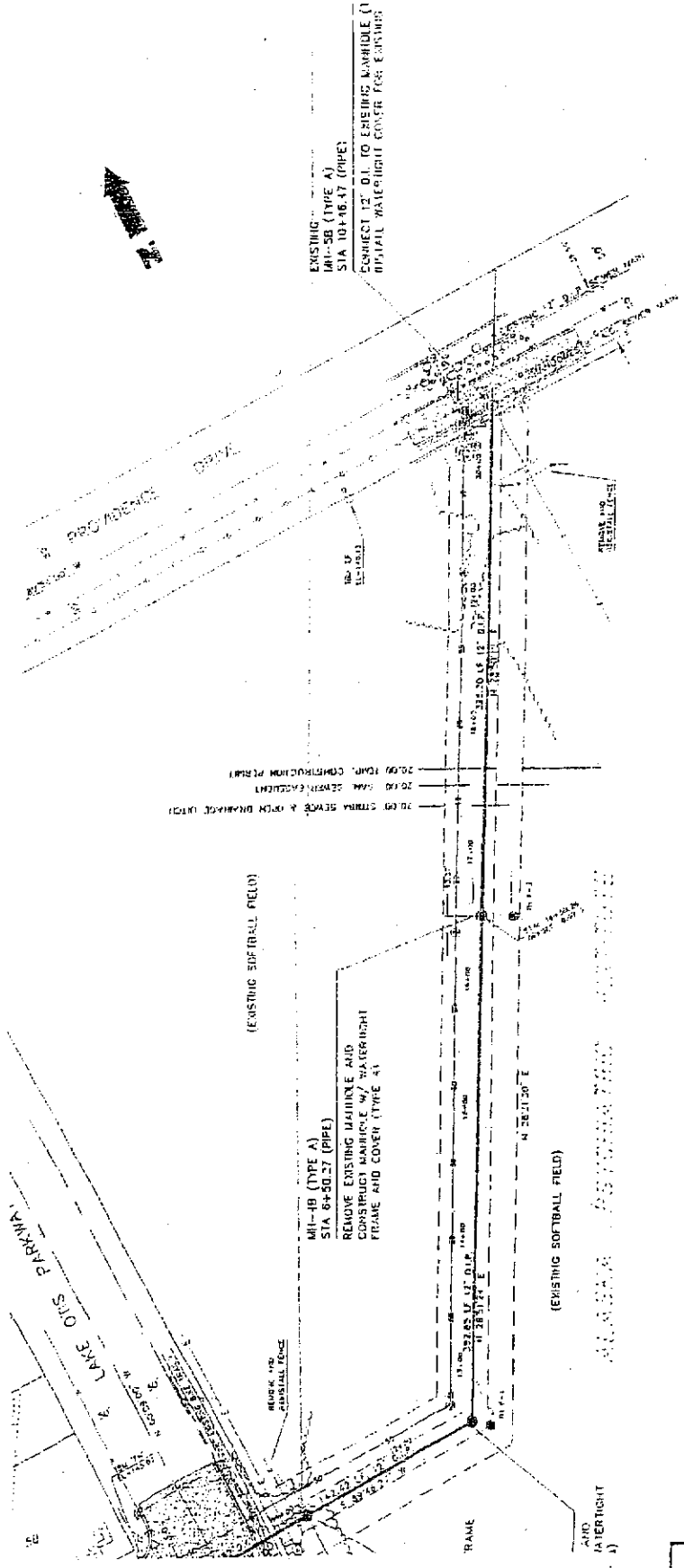
A-10

APPENDIX B

SHANNON & WILSON, INC. GEOTECHNICAL REPORT
EAST 38th/PROVIDENCE SEWER R&R

APPENDIX D

AWWU AS-BUILT 18873



MHTL Subdivision Anchorage, Alaska	
18873 ASBUILT	
August 2002	32-1-0137
SHANNON & WILSON, INC. Geotechnical & Environmental Consultants	Appendix D

TLO 92-64.01

APPENDIX E

AWWU UTILITY RELOCATION INFORMATION PACKET

ANCHORAGE WATER & WASTEWATER UTILITY

PRIVATE DEVELOPMENT INFORMATIONAL PACKAGE

1. Instruction Form
2. Application Form (Both sides must be filled in completely)
3. Engineer's Preliminary Cost Estimate Work Sheet (Sanitary Sewer)
4. Engineer's Preliminary Cost Estimate Work Sheet (Water)
5. Sample Map
6. Plan Review Checklist (Engineer is to check each item)

USEFUL TELEPHONE NUMBERS

Private Development Extension Agreements . . . Sandy Parr . .	564-2747
Private Development Plan Review . . . . . Wayne Bennett	564-2723
Private System Plan Review	261-5729
Sanitary Sewer & Water Assessments	564-2716
Sanitary Sewer & Water Planning	564-2739
Sanitary Sewer & Water Permits	564-2762

Step 1 Application

A. Complete both sides of the sanitary sewer and/or water main extension agreement application and the Engineer's Preliminary Cost Estimate form. Forms are attached and additional forms are available from AWWU Planning Section, Private Development Unit.
B. Submit two copies of preliminary plat if re-subdividing or re-platting. If not re-platting, submit two copies of existing plat(s).
C. Attach a project and vicinity map sheet showing the proposed improvements. Submit an 8½ X 14 inch map sheet of the proposed development divided into three cells as follows: Cell 1: Approximately 8 X 9 inches of the map shall show the existing or proposed platted lots and the locations of the existing and proposed sanitary sewer and/or water mains, applicable scale and a corresponding legend. Cell 2: Approximately 4 X 3 inches shall be a vicinity map. Cell 3: Approximately 4 X 2 inches will be the title block with development name, grid number, date and AWWU project number. See attached example.
D. On all replatting actions, attach a copy of the summary of action or condition to plat from the Platting Board Authority. Submit a copy of the certificate to plat.
E. If Developer is a corporation or partnership, the president or general partner must sign the agreement. In the event the president or general partner cannot sign, attach a notarized corporate letter authorizing another officer of the corporation or partnership to sign documents in lieu of the president or general partner. If property ownership has recently changed, recorded proof of ownership is required.
F. The fees required for deposit with AWWU for each mainline extension agreement per the Anchorage Municipal Code, Title 24, are as follows:

Estimated Construction Cost	Deposit
$10,000.00 or less	$300.00
over $10,000.00 up to $50,000.00	4% of estimated cost
over $50,000.00 up to $150,000.00	3% of estimated cost
over $150,000.00 up to $500,000.00	2.5% of estimated cost
over $500,000.00	$13,000.00

The deposit shall be paid in accordance with the following schedule:
1. Upon application for each agreement (sanitary sewer or water): $300.00.
2. Upon submittal of preliminary plans: $150.00 or 0.5% plan review deposit. whichever is greater
3. Prior to issuance of the notice-to-proceed: the balance of the aforementioned deposit.

Step 2 Plan Review & Approval

A. Submit five sets of preliminary plans (24" X 36").
B. Upon submittal of the preliminary plans for the improvements, pay a plan review checking fee (see F.2 above). Plan checking fees shall be paid prior to AWWU preliminary plan reviews.
C. AWWU will review preliminary plans and return a plan review comment letter to the Engineer with a courtesy copy to the Developer.
D. Upon resolution of AWWU plan review comments, submit seven sets of final plans for approval.

Step 3 Supporting Documentation

The Developer must provide to the AWWU Planning Section, Private Development Unit, the following support documents prior to AWWU issuing a Notice-To-Proceed:

A. A letter signed by both the Developer and the Engineer stating that the Developer has retained the Engineer for the entire duration of the two-year warranty period (refer to Steps 7 & 8). This retainer is for purposes of effecting correction of any and all defects noted prior to the end of the warranty period. Refer to Articles 3.01 through 3.05 of subject sanitary sewer or water main extension agreement.
B. Engineer's Quality Control Study which shall include schedule for submitting construction inspection reports. The Engineer shall submit weekly reports to AWWU's Project Management Supervisor.
C. Contractor's Construction Schedule.
D. Contractor's Liability Insurance Certificate for a minimum of $1,000,000 umbrella coverage (Reference: Municipality of Anchorage Standard Specifications, latest edition, Section 10.06, Article 6.9d).
E. Proof of Contractor's right-of-way Bond on file with the Municipality of Anchorage, Department of Public Works.
F. Performance Guarantee equal to 100% of the estimated cost of the project plus an additional over run allowance, usually 20%, (Anchorage Municipal Code, Title 21, Section 21.87.030b).
G. A copy of all recorded documents for any easements and/or rights-of-way not included on the preliminary or filed plat.
H. A copy of all required Federal, State and Municipal permits/waivers (i.e., Wetlands, well encroachments, R-O–W, easements, Fish & Game, etc.) .
I. For all water extension projects, concurrence and written approval from Municipality of Anchorage Fire Department for fire hydrant stationing.

Step 4 Notice-To-Proceed

A. Submit a written request for the Contractor's Notice-to-Proceed.
B. Pay remainder of fees required for deposit under Steps 1 and 2 (see above).
C. Pay a $500 deposit to AWWU for the cost of adjusting each fire hydrant.
D. Pay all sanitary sewer and water connection permit fees, as applicable, to AWWU.
E. Upon submittal of all items listed in Step 3 and completion of Items A - D, Step 4, AWWU will approve the request for Notice-to-Proceed. (NOTE: for an AWWU extension which is a part of an overall subdivision agreement, the Notice-to-Proceed must also carry the approval of the Municipal Department of Public Works).
F. The Developer will receive a Notice-to-Proceed at a scheduled pre-construction conference. The following persons will attend this conference:

AWWU's Private Development Unit Representative(s)
AWWU's Project Management Representative(s)
Developer (optional)
Developer's Engineer
Developer's Construction Contractor

Step 5 Inspection

A. Following completion of construction, AWWU will inspect the project for conformance with the Municipality of Anchorage Standard Specifications (latest edition), as amended. Special attention will be given to the following items:

(1) Open bore flushing
(2) Pressure testing
(3) Chlorination
(4) Continuity tests
(5) Key boxes and valve markers
(6) Manholes, inverts, dust pans, etc.
(7) Stub-out markers

B. The AWWU Inspector will provide AWWU Planning Section, Private Development Unit, with a written notice indicating acceptability when the newly constructed facilities meet municipal standards.

Step 6 Service Connection / Extension Permit(s)

A. Sanitary sewer and/or water service connection permits (the portion from the main to the edge of the right-of-way) will be issued to the Contractor at the pre-construction meeting.
B. Sanitary sewer and/or water extension permits (on-property) will be issued upon AWWU Field Services Section receiving written notice of the main passing a pre-final inspection from AWWU Inspector.
C. To eliminate delays in the issuance of permits, the Developer shall notify the AWWU Field Services Section in advance of the date permits are required, in accordance with the following:

1-5 permits	- no advanced notice required
6-25 permits	- 4 working hours
26-100 permits	- 1 working day
101 or more permits	- 2 working days

Step 7 Acceptance under Warranty

A. The Developer or his Engineer shall request a final inspection by AWWU of the sanitary sewer and water facilities prior to project being placed under warranty by AWWU.
B. The Developer shall financially guarantee the construction for a period of two years in accordance with Anchorage Municipal Code, Title 21, Section 21.87.037. The Developer shall provide AWWU a secured warranty guarantee in the form of a corporate surety bond, cash deposit or letter of credit in the amount listed below:

Total Construction Cost	Percent to Secure Warranty Guarantee
$0 – $500,000	10%
$500,000 – $1,000,000	7½%
$1,000,000 and higher	5%

The Developer shall submit the secured warranty guarantee prior to start of the warranty period.

C. In addition to the secured warranty guarantee, the Developer shall submit a cash deposit, with AWWU, as required by Anchorage Municipal Code, Title 24, Section

during the warranty period. Shown below is the schedule of the cash deposit amounts. The amount of the deposit shall be for each agreement (i.e., sanitary sewer and water deposits cannot be combined). The Developer shall submit the cash deposit prior to the beginning of the warranty period. AWWU will refund all unencumbered funds to the Developer at the close of the warranty period.

Certified Project Costs	Required Cash Deposit
Less than $10,000.00	$ 500.00
$10,000.00 to $50,000.00	$ 1,000.00
$50,000.01 to $150,000.00	$ 1,500.00
Over $150,000.00	$ 2,000.00

D. AWWU will issue the Developer a letter of acceptance for the maintenance of the sanitary sewer and water off-property facilities under a two year warranty period upon completion of the following:
   1. Inspection and approval of the project by the AWWU Inspector as outlined in Step 5.
   2. Receipt and acceptance of one set of reproducible mylar asbuilt drawings and two sets of blue line drawings. Asbuilt measurements shall be in accordance with the AWWU Design Criteria (latest edition), Section 50.00.
   3. Receipt and approval of the Developer's certified cost statement using a form provided by AWWU. (NOTE: Failure to submit an approved certified cost statement within 180 days of receipt of written notification of the project having successfully completed a final inspection may be sufficient justification for the AWWU to deny any reimbursement due to the Developer.)
   4. Developer is to remit payment of all outstanding charges relating to the project.

Step 8 Warranty Inspection

A. Within two years following acceptance for warranty, AWWU will perform a warranty inspection. When the facilities have been found to meet Municipal standards and all obligations of the Developer to the Municipality have been satisfied, AWWU will issue a final letter of acceptance of full responsibility for future maintenance of the project and release the extension agreements, secured warranty guarantees and the balance of all deposits held by AWWU.

APPENDIX F

IMPORTANT INFORMATION ABOUT YOUR
GEOTECHNICAL/ENVIRONMENTAL REPORT

Important Information About Your Geotechnical/Environmental Report

CONSULTING SERVICES ARE PERFORMED FOR SPECIFIC PURPOSES AND FOR SPECIFIC CLIENTS.

Consultants prepare reports to meet the specific needs of specific individuals. A report prepared for a civil engineer may not be adequate for a construction contractor or even another civil engineer. Unless indicated otherwise, your consultant prepared your report expressly for you and expressly for the purposes you indicated. No one other than you should apply this report for its intended purpose without first conferring with the consultant. No party should apply this report for any purpose other than that originally contemplated without first conferring with the consultant.

THE CONSULTANT'S REPORT IS BASED ON PROJECT-SPECIFIC FACTORS.

A geotechnical/environmental report is based on a subsurface exploration plan designed to consider a unique set of project-specific factors. Depending on the project, these may include: the general nature of the structure and property involved; its size and configuration; its historical use and practice; the location of the structure on the site and its orientation; other improvements such as access roads, parking lots, and underground utilities; and the additional risk created by scope-of-service limitations imposed by the client. To help avoid costly problems, ask the consultant to evaluate how any factors that change subsequent to the date of the report may affect the recommendations. Unless your consultant indicates otherwise, your report should not be used: (1) when the nature of the proposed project is changed (for example, if an office building will be erected instead of a parking garage, or if a refrigerated warehouse will be built instead of an unrefrigerated one, or chemicals are discovered on or near the site); (2) when the size, elevation, or nfiguration of the proposed project is altered; (3) when the location or orientation of the proposed project is modified; , when there is a change of ownership; or (5) for application to an adjacent site. Consultants cannot accept responsibility for problems that may occur if they are not consulted after factors which were considered in the development of the report have changed.

SUBSURFACE CONDITIONS CAN CHANGE.

Subsurface conditions may be affected as a result of natural processes or human activity. Because a geotechnical/environmental report is based on conditions that existed at the time of subsurface exploration, construction decisions should not be based on a report whose adequacy may have been affected by time. Ask the consultant to advise if additional tests are desirable before construction starts; for example, groundwater conditions commonly vary seasonally.

Construction operations at or adjacent to the site and natural events such as floods, earthquakes, or groundwater fluctuations may also affect subsurface conditions and, thus, the continuing adequacy of a geotechnical/environmental report. The consultant should be kept apprised of any such events, and should be consulted to determine if additional tests are necessary.

MOST RECOMMENDATIONS ARE PROFESSIONAL JUDGMENTS.

Site exploration and testing identifies actual surface and subsurface conditions only at those points where samples are taken. The data were extrapolated by your consultant, who then applied judgment to render an opinion about overall subsurface conditions. The actual interface between materials may be far more gradual or abrupt than your report indicates. Actual conditions in areas not sampled may differ from those predicted in your report. While nothing can be done to prevent such situations, you and your consultant can work together to help reduce their impacts. Retaining your (ultant to observe subsurface construction operations can be particularly beneficial in this respect.

A REPORT'S CONCLUSIONS ARE PRELIMINARY.

The conclusions contained in your consultant's report are preliminary because they must be based on the assumption that conditions revealed through selective exploratory sampling are indicative of actual conditions throughout a site. Actual subsurface conditions can be discerned only during earthwork; therefore, you should retain your consultant to observe actual conditions and to provide conclusions. Only the consultant who prepared the report is fully familiar with the background information needed to determine whether or not the report's recommendations based on those conclusions are valid and whether or not the contractor is abiding by applicable recommendations. The consultant who developed your report cannot assume responsibility or liability for the adequacy of the report's recommendations if another party is retained to observe construction.

THE CONSULTANT'S REPORT IS SUBJECT TO MISINTERPRETATION.

Costly problems can occur when other design professionals develop their plans based on misinterpretation of a geotechnical/environmental report. To help avoid these problems, the consultant should be retained to work with other project design professionals to explain relevant geotechnical, geological, hydrogeological, and environmental findings, and to review the adequacy of their plans and specifications relative to these issues.

BORING LOGS AND/OR MONITORING WELL DATA SHOULD NOT BE SEPARATED FROM THE REPORT.

Final boring logs developed by the consultant are based upon interpretation of field logs (assembled by site personnel), field test results, and laboratory and/or office evaluation of field samples and data. Only final boring logs and data are customarily included in geotechnical/environmental reports. These final logs should not, under any circumstances, be redrawn for inclusion in architectural or other design drawings, because drafters may commit errors or omissions in the transfer process.

To reduce the likelihood of boring log or monitoring well misinterpretation, contractors should be given ready access to the complete geotechnical engineering/environmental report prepared or authorized for their use. If access is provided only to the report prepared for you, you should advise contractors of the report's limitations, assuming that a contractor was not one of the specific persons for whom the report was prepared, and that developing construction cost estimates was not one of the specific purposes for which it was prepared. While a contractor may gain important knowledge from a report prepared for another party, the contractor should discuss the report with your consultant and perform the additional or alternative work believed necessary to obtain the data specifically appropriate for construction cost estimating purposes. Some clients hold the mistaken impression that simply disclaiming responsibility for the accuracy of subsurface information always insulates them from attendant liability. Providing the best available information to contractors helps prevent costly construction problems and the adversarial attitudes that aggravate them to a disproportionate scale.

READ RESPONSIBILITY CLAUSES CLOSELY.

Because geotechnical/environmental engineering is based extensively on judgment and opinion, it is far less exact than other design disciplines. This situation has resulted in wholly unwarranted claims being lodged against consultants. To help prevent this problem, consultants have developed a number of clauses for use in their contracts, reports and other documents. These responsibility clauses are not exculpatory clauses designed to transfer the consultant's liabilities to other parties; rather, they are definitive clauses that identify where the consultant's responsibilities begin and end. Their use helps all parties involved recognize their individual responsibilities and take appropriate action. Some of these definitive clauses are likely to appear in your report, and you are encouraged to read them closely. Your consultant will be pleased to give full and frank answers to your questions.

The preceding paragraphs are based on information provided by the
ASFE/Association of Engineering Firms Practicing in the Geosciences, Silver Spring, Maryland

This area for AWWU Office use only:	Anchorage Grid Number _____
Water Project ID #540-_____	AWWU Project File # _____
Sewer Project ID #550-_____	AWWU AMS File # _____
	P.W. Project File # _____

ANCHORAGE WATER AND WASTEWATER UTILITY
SANITARY SEWER AND/OR WATER MAIN EXTENSION AGREEMENTS APPLICATION

DEVELOPER INFORMATION:	CONSULTING ENGINEER:
NAME: _____	NAME: _____
CONTACT PERSON: _____	CONTACT PERSON: _____
MAILING ADDRESS: _____	LICENSE # & EXP DATE: _____
CITY/STATE _____ ZIP _____	MAILING ADDRESS: _____
TELEPHONE: _____	CITY/STATE _____ ZIP _____
FAX Number: _____	TELEPHONE: _____
E-Mail: _____	FAX Number: _____
	E-Mail: _____

DEVELOPER WHO WILL BE LISTED IN THE AGREEMENT IS: _____
(e.g.: INDIVIDUAL, PARTNERSHIP, CORPORATION, LLC, or OTHER)

PERSON SIGNING THE AGREEMENT WILL BE:

NAME: _____
(Please print)

TITLE: _____
(e.g.: INDIVIDUAL, PARTNER, GENERAL PARTNER, PRESIDENT, MANAGING MEMBER, OTHER)
PROVIDE BUSINESS ORGANIZATIONAL DOCUMENTATION AND LETTER OF SIGNATURE AUTHORITY/ARTICLE OF ORGANIZATION/INCORPORATION

DEVELOPER INFORMATION TO BE SUBMITTED WITH APPLICATION:

A. _____ ZONING OF PROPERTY _____
B. _____ PLATTING CASE NUMBER _____
C. _____ PROPERTY'S PROPOSED LEGAL DESCRIPTION _____
D. _____ FILED PLAT NUMBER _____
E. _____ PROPERTY'S EXISTING LEGAL DESCRIPTION _____
F. _____ PROPERTY ID # _____
G. _____ CERTIFICATE TO PLAT
H. _____ CONDITIONS TO PLAT
I. _____ CORPORATE DOCUMENT (IF APPLICABLE)
J. _____ PROOF OF OWNERSHIP
K. _____ ESTIMATED NUMBER OF LOTS TO BE DEVELOPED _____
L. _____ AREA MAP OF EXISTING AND PROPOSED WATER AND SEWER IMPROVEMENTS
M. _____ OTHER RELATED INFORMATION _____

FOR DEVELOPER OR CONSULTANT	FOR ANCHORAGE WATER & WASTEWATER UTILITY
PREPARED BY: _____	RECEIVED BY: _____
ORGANIZATION: _____	DEPOSIT PROVIDED: _____
	DATE: _____

DEVELOPER'S ESTIMATED SANITARY SEWER MAIN PROJECT COSTS:

	Rounded up to the next thousand $'s
A. Estimated construction cost for approximately _____ LF of _____ inch sanitary sewer main at an estimated cost of $_____ per lineal foot (attach Engineer's cost estimate):	$ ____,000.00
B. Estimated oversizing credits (Engineer to provide a schedule of lineal feet and appurtenances with current prices):	$ <___,000.00>
C. Estimated consultant engineering and contract administrative charges:	$ ____,000.00
Estimated Cost (Sub-Total)	$ ____,000.00
D. Estimated AWWU contract administration charges (see Deposit Schedule at bottom of page for amount - $1,000 minimum):	$ ____,000.00
DEVELOPER'S TOTAL ESTIMATED SANITARY SEWER MAIN COSTS	$ ____,000.00

For Plan Review: Deposit = 1/2% of Sub-Total or $150.00 which ever is greater.

DEVELOPER'S ESTIMATED WATER MAIN PROJECT COSTS:

	Rounded up to the next thousand $'s
A. Estimated construction cost for approximately _____ LF of _____ inch water main at an estimated cost of $_____ per lineal foot (attach Engineer's cost estimate):	$ ____,000.00
B. Estimated oversizing credits (Engineer to provide a schedule of lineal feet and appurtenances with current prices):	$ <___,000.00>
C. Estimated consultant engineering and contract administrative charges:	$ ____,000.00
Estimated Cost (Sub-Total)	$ ____,000.00
D. Estimated AWWU contract administration charges (see Deposit Schedule at bottom of page for amount - $1,000 minimum):	$ ____,000.00
DEVELOPER'S TOTAL ESTIMATED WATER MAIN COSTS	$ ____,000.00

For Plan Review: Deposit = 1/2% of Sub-Total or $150.00 which ever is greater.

Deposit Schedule (per AMC Title 24):

To calculate Item #D above, use the following at a minimum:
- $50,000 or less - 4% of the Sub-Total
- $50,000 to $150,000 - 3% of the Sub-Total
- $150,000 to $500,000 - 2.5% of the Sub-Total
- $500,000 or greater - $13,000.00

ENGINEER'S PRELIMINARY COST ESTIMATE (Water)

Project Title _____ Sheet _____ of _____

ITEM NO.	DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT COST	TOTAL COST

CONSTRUCTION TOTAL $_____

Prepared by: _____

Date: _____

NOTE: Cost Estimate must be attached to the Water Main Extension Agreement application.

ENGINEER'S PRELIMINARY COST ESTIMATE (Sanitary Sewer)

Project Title _____ Sheet _____ of _____

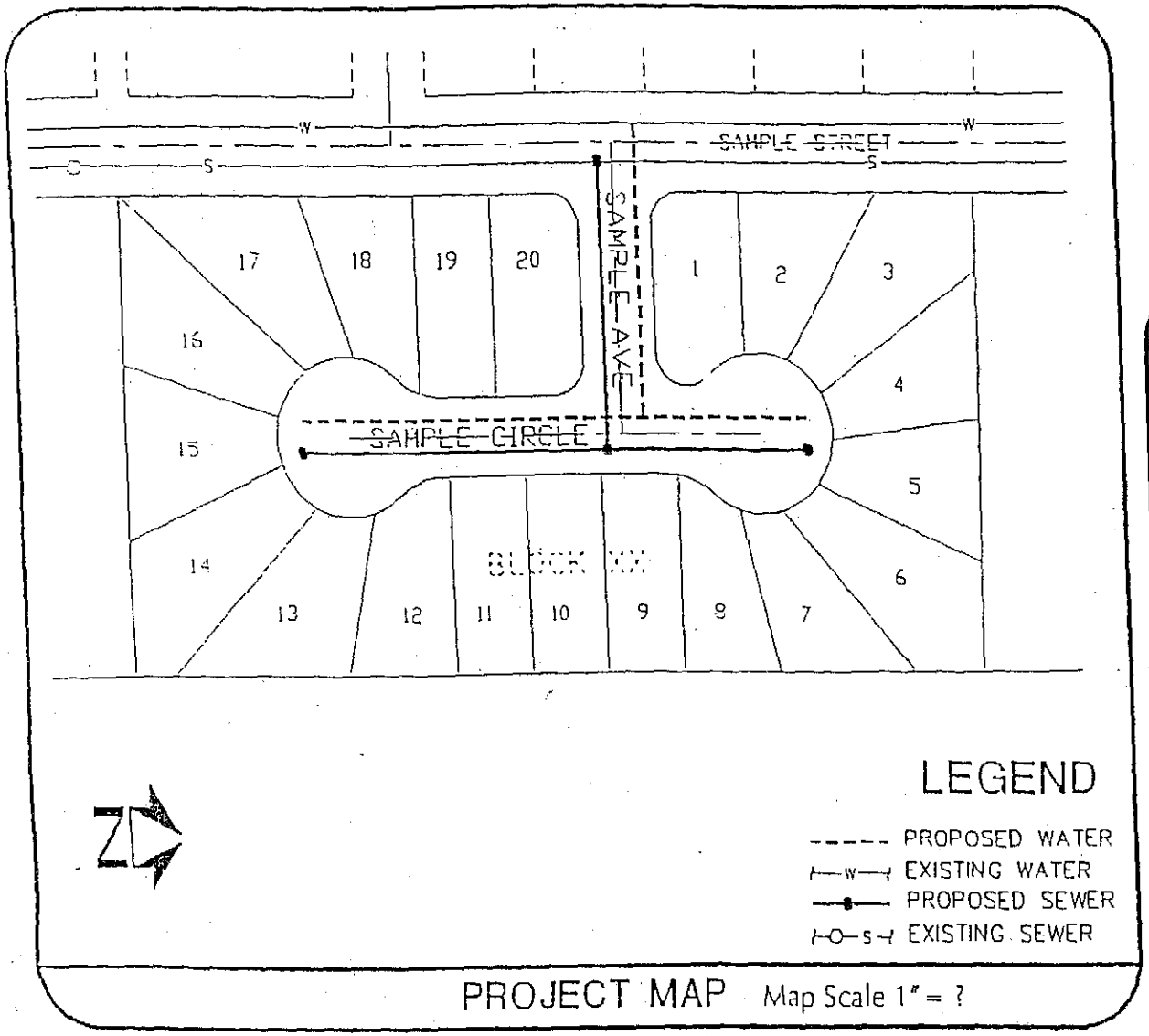
ITEM NO.	DESCRIPTION	UNIT	ESTIMATED QUANTITY	UNIT COST	TOTAL COST

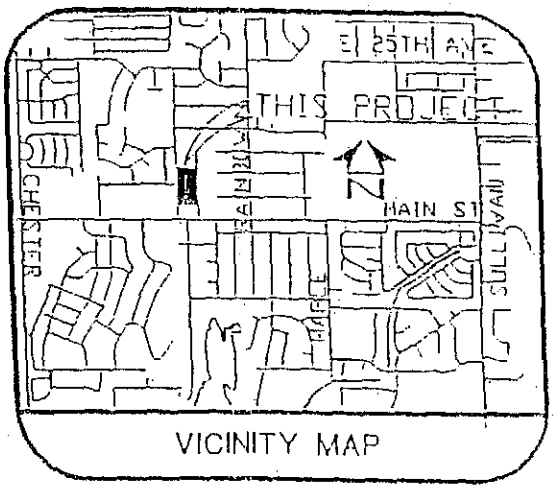
CONSTRUCTION TOTAL $_____

Prepared by: _____

Date: _____

NOTE: Cost Estimate must be attached to the Sanitary Sewer Main Extension Agreement application.





EXAMPLE ESTATES
WATER AND SEWER
IMPROVEMENTS

WSXX-XXX
GRID XXXX

No Specified Scale

EXAMPLE.DWG – DATE –

NOTE: The following plan review requirement guide is generic and may not apply to each project. This does not relieve the Engineer from any errors or omissions on the plans. The plan review requirement guide is intended as an aid in compiling comprehensive plans. AWWU does not warrant that use of this guide will substitute need for engineered plans or supersede plan review requirements.

General comments:

Show the Anchorage Water & Wastewater Utility (AWWU) reimbursable W.O. #'s on each sheet. Show the water W.O.# on the water sheets and the sanitary sewer W.O.# on the sewer sheets.

Provide an approval from the MOA, Department of Public Works (DPW). The Engineer is responsible for coordinating with and securing approval.

Determine if the improvements conflict with DPW's "insulated streets". Show the affected street in the plan view and show the insulation replacement in the street cross section.

Show all easements in the plan views. A 30 foot easement is required for single utility and 40 foot for both water and sanitary sewer. The easement shall be measured from center of pipe.

Provide an approval from the State of Alaska, Department of Transportation (DOT/PF) for all DOT/PF controlled roads or streets. The Engineer is responsible for coordinating with and securing the permits from the DOT/PF.

A wetland permit is required if the development encroaches upon a designated wetland. The Engineer is to apply for and secure the wetland permit.

Plans are to be stamped and signed by an engineer registered in the State of Alaska.

Provide a "vicinity" map of the area to be served.

Provide a "key" map at the scale of 1" = 500'. The "key" map is to include existing and proposed utilities, service area boundary, street names, subdivision names, lot and block numbers.

Provide a legend of the map symbols used. The legend shall conform to the AWWU Design Criteria, latest edition. The legend is to correlate with the plan and profile views.

Show on the plans the Owner's name, address, telephone number and signature.

Reference that all construction shall be in accordance with the Municipality of Anchorage Standard Specifications (MASS), latest edition.

Provide a cover sheet if the plans are more than two (2) pages.

Show a north arrow on each sheet and verify that the arrow is in the correct direction.

Provide a title block on each sheet with the engineering firm, address and telephone number.

Verify the horizontal and vertical scales are in accordance to AWWU Design Criteria, latest edition.

Show all street centerlines and dimension the utility from the street centerline.

Identify all rights-of-way with correct street names.

Show all AWWU lines with pipe centerline stationing. If street stationing is used, provide the equivalent pipe stationing.

Show sanitary sewer and water mains in the standard MASS location (unless otherwise approved by DPW and AWWU). Sanitary sewer mains are generally south or west side of the street centerline. In an easement, show the sanitary sewer and water main centerline located at least fifteen (15) feet from the easement lines.

Show the distance and bearing of each pipe segment in the plan view.

Specify the trench compaction. AWWU requires 95% compaction. Show the compaction in the street cross section view.

Indicate the pipe bedding in the street cross section. Pipe bedding shall be in accordance with MASS.

The survey datum is to be specified. Is datum adjusted to NGS-72?

Describe the BM's and TBM's in the notes and show on plans/profile.

Show all existing utilities.

Show the size of the existing water/sewer mains in the plan and profile views.

Indicate all subdivision names, boundaries, lot, and block numbers in the plan view.

Show the MOA grid number on each water and sanitary sewer plan sheets in the title block.

Show all existing and proposed easements and rights-of-way in the plan views.

All revegetation restoration shall be addressed for easements and rights-of-way.

Provide 100% lot frontage for each parcel to be served (unless otherwise approved by AWWU).

Show all available test holes and soils conditions.

Show a minimum 10 feet horizontal separation and 18 inches vertical separation between all water (mains and services) and any sanitary sewer or storm (mains and services).

Provide a minimum of three (3') feet separation between all water or sanitary sewer lines and any storm drain lines. Provide four (4") inches of insulation if the 3' separation can not be obtained.

Show the proposed finished grade in the plan view.

Define the type and size of water and sanitary sewer service connection and extensions.

In the general construction notes require polyethylene encasement "baggies" as defined in MASS 50.13 and 60.07.

Water Comments

Secure an approval from the MOA Fire Department for the location of the fire hydrants.

Station the fire hydrants 5 feet from the property line into the right-of-way and centered on common lot lines (unless otherwise approved by AWWU).

In the plan and profile views, show the type and class of water pipe to be used.

For services connections larger than standard single family residential, provide a total number of fixture units per lot and length to most distant fixture specified. Provide MOA Building Safety Division approval for the line size.

Minimum size of water main in residential development is eight (8) inches in diameter. In cul-de-sacs main shall be reduced to six (6) inch after the last fire hydrant.

Show the water / sanitary sewer line crossings at right angles.

Show the size and type of water service connects in the general construction notes or in the plan view.

Provide ten (10) feet of cover over the water mains.

Provide two (2) valves at each tee and three (3) valves at each cross.

Show water valves on mains greater than (12) inch in diameter as butterfly valves.

Provide a minimum of 10 feet of horizontal separation between the water service and any street lights.

Show fire hydrants on mains of twelve (12) inches or greater in diameter as double pumpers fire hydrants. AWWU may waive the double pumper fire hydrant requirement where the mains are in residential areas.

In areas of varying terrain, show a fire hydrant for air relief purposes at the high points.

Provide fifteen (15) feet of clearance around the fire hydrant for all services, street lights and catch basins..

Provide restrained fittings or call out thrust blocks at all tees, bends and stub-outs.